Serving the CoCo Community for

The RAINBOW® 11 YEARS

THE COLOR COMPUTER MONTHLY MAGAZINE

July 1991 Vol. X No.11

Canada $4.95 U.S. $3.95

Birthday Bash

Do the Modem Pak/RS-232 Conversion

Try Desktop Publishing With *Ultralace*

Take a Super Chance With *Superdice*

Control Your House Inventory

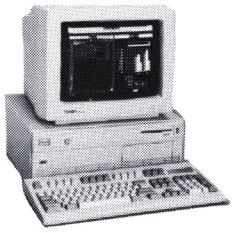
Plus an index to the past year of THE RAINBOW

Best Wishes
On your
Birthday
and
Many More

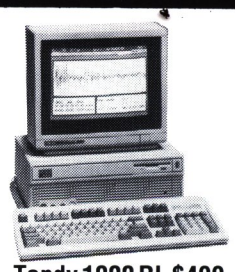
From Computer Plus to YOU . . .

PLUS after PLUS after PLUS

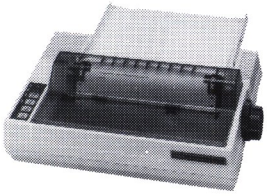
Tandy 1100 FD $689
Tandy 102 32K $439
Tandy WP-2 $279



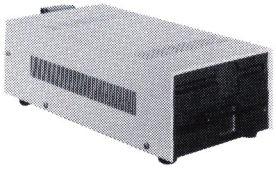
Tandy 2500 XL/2 $1099
Tandy 4020 SX $1499



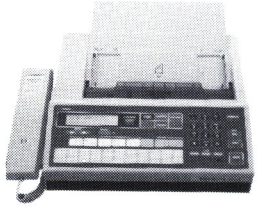
Tandy 1000 RL $499
Tandy 1000 TL/3 $510*



DMP-134 $179*



Color Computer Disk Drive
Drive 0 $239 Drive 1 $149



TandyFax 1010 $529*

BIG SAVINGS ON A FULL COMPLEMENT OF RADIO SHACK COMPUTER PRODUCTS

COMPUTERS	
Tandy 1000 RLX HD 1 Drive 1Meg RAM	999.00
Tandy 1500 HD 1 Drive 640K	1499.00
Tandy 2810 HD 1 Drive 1 Meg RAM	1859.00 *
Tandy 1000 RL HD-1 Drive-512K	599.00 *
Tandy 1100 FD 1 Drive 640K	689.00
PRINTERS	
Tandy DMP-107 120 CPS	219.00
Tandy DMP-302 270 CPS	469.00
Tandy DMP-202 180 CPS	299.00
Tandy DMP-442 300 CPS	359.00 *
Tandy LP-950 Laser Printer	1299.00
Tandy DMP-240 192 CPS 8 color	389.00 *
Panasonic KXP 1180 192 CPS	189.00 *
Panasonic KXP 1123 24 Wirehead	259.00 *
Panasonic KXP 1124 192 CPS	299.00 *
Okidata 320 300 CPS	369.00
Okidata 380 180 CPS 24 Wire HD	259.00
OKI Laser 400 4PPM	699.00 *
MODEMS	
Tandy DCM-6	52.00
Tandy DCM-7	85.00
Cardinal 1200 Baud External	99.00
Cardinal 2400 Baud	129.00

COLOR COMPUTER MISC.	
Tandy Drive Controller	89.00 *
Extended Basic Rom Kit (28 pin)	14.95
64K Ram Upgrade Kit (2 or 8 chip)	39.00
Tandy Deluxe Keyboard Kit	24.95
HI-RES Joystick Interface	8.95
Color Computer Deluxe Mouse	44.00
Multi Pak Pal Chip for COCO 3	14.95
COCO 3 Service Manual	29.95
Serial to Parallel Converter	59.95
Tandy Deluxe Joystick	19.95
Magnavox 8135 RGB Monitor	299.00
Magnavox Green or Amber Monitor	99.00
CoCo 3 Gime Chip	29.95
Tandy Pistol Grip Joystick	26.95
PBJ OK COCO 3 Upgrade Board	29.95
PBJ 512K COCO 3 Upgrade	89.00
Tandy OK COCO 3 Upgrade Board	39.95
Tandy 512K COCO 3 Upgrade	99.00 *

COLOR COMPUTER SOFTWARE	**TAPE**	**DISK**
The Wild West (COCO 3)		25.95
Worlds of Flight	34.95	34.95
Mustang P-51 Flight Simul.	34.95	34.95
Flight 16 Flight Simul.	34.95	34.95

Tandy Educatioal Software		2.00
Spinnaker Software		2.00
Max 10 by Colorware		79.95
AutoTerm by PXE Computing	29.95	39.95
TW-80 by Spectrum (COCO 3)		39.95
TeleWriter 64	49.95	59.95
TeleWriter 128		79.95
Elite Word 80		79.95
Elite Calc 3.0		69.95
CoCo 3 512K Super Ram Disk		19.95
Home Publishing by Tandy (CoCo 3)		35.95
Sub Battle Sim. by Epyx (CoCo 3)		26.95
Thexder by Sierra (CoCo 3)		22.45
Kings Quest III by Sierra (CoCo 3)		31.45
Flight Sim. II by SubLogic (CoCo 3)		31.45
OS-9 Level II by Tandy		71.95
OS-9 Development System		89.95
Multi-View by Tandy		44.95
VIP Writer (disk only)		69.95
VIP Integrated Library (disk)		149.95

Prices are subject to change without notice. Please call for shipping charges. Prices in our retail store may be higher. Send for complete catalog.

***Sale prices through 7-15-91**

CALL TOLL FREE
1-800-343-8124

- *LOWEST POSSIBLE PRICES*
- *BEST POSSIBLE WARRANTY*
- *KNOWLEDGEABLE SALES STAFF*
- *TIMELY DELIVERY*
- *SHOPPING CONVENIENCE*

VISA AMERICAN EXPRESS MasterCard

computer plus

P.O. Box 1094
480 King Street
Littleton, MA 01460

SINCE 1973

IN MASSACHUSETTS CALL (508) 486-3193

Tandy is a registered trademark of Tandy Corp.

Serving the CoCo Community for

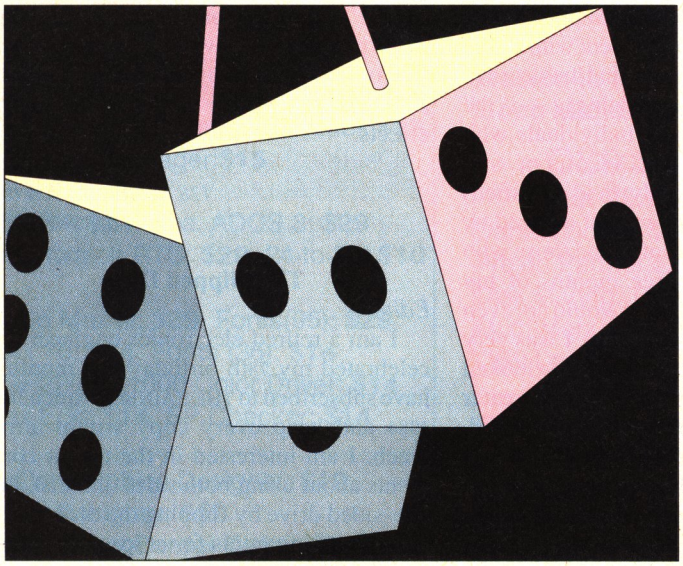
RAINBOW

11 YEARS

Table of Contents

July 1991
Vol. X No. 12

Features



41

10
RS-232 Retrofit
Marty Goodman
A how-to for converting a DC Modem Pak into an RS-232 pack

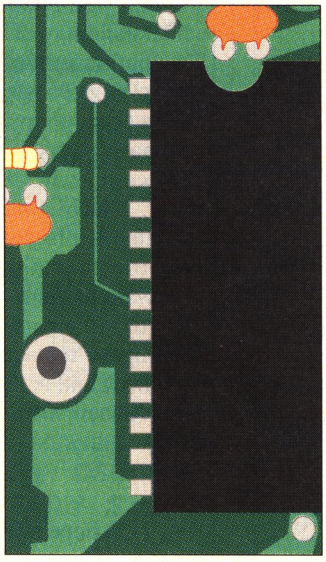
22
CoCo Conversations
Steven Ford
Getting your ham radio license is now even easier

28
Assembly Line
William P. Nee
The machine-language mailbag

34
Ultralace: The Tandy Version
H. Allen Curtis
Part III brings the Tandy version of the main Ultralace program

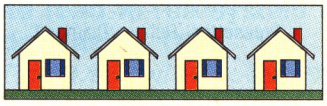
41
Superdice
David Schaller
A modern roll for a seasoned game

10



60
Tenth Year of The RAINBOW
Rob Moore
An index to articles and reviews since the July 1990 issue

14



The cassette tape/disk symbols beside features and columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE and RAINBOW ON DISK. Those with only the disk symbol are not available on RAINBOW ON TAPE. For details, check the RAINBOW ON TAPE and RAINBOW ON DISK ad on page 24.

14
House Inventory
Bob Griffard
Making a list and checking it twice

Product Reviews

CoCo Labels/*The Trading Post* ____ 51
Crystal City/*Sundog Systems* ____ 53
The Digitizer 3+/*D.S.D. Software* ____ 51
Match 'em/*Johnson Software* ____ 55
NIB Swimsuits & Lingerie, Vol. I/*Steve Ricketts* ____ 54
Util Disk/*N*Johnson Software* ____ 52

Columns

18
CoCo Consultations
Marty Goodman
Monitor extender cables

45
Delphi Bureau
Eddie Kuns
A mixed bag of tricks

58
OS-9 Hotline
Rainbow Staff
Passing parameters

8
Print#-2
Lonnie Falk
Editor's notes

48
Turn of the Screw
Tony DiStefano
A slice of time

Departments

Advertisers Index ____ 65
Back Issue Info ____ 64
Letters to Rainbow ____ 4
Received & Certified 56
Submitting Material ____ 52
Subscription Info ____ 7

THE RAINBOW is published every month of the year by FALSOFT, Inc., The Falsoft Building, 9509 U.S. Highway 42, P.O. Box 385, Prospect, KY 40059, phone (502) 228-4492. **THE RAINBOW**, **RAINBOWfest** and **THE RAINBOW** and **RAINBOWfest** logotypes are registered trademarks of FALSOFT, Inc. ● Second class postage paid Prospect, KY and additional offices. USPS N. 705-050 (ISSN No. 0746-4797). POSTMASTER: Send address changes to **THE RAINBOW**, P.O. Box 385, Prospect, KY 40059. Authorized as second class postage paid from Hamilton, Ontario by Canada Post, Ottawa, Ontario, Canada. ● Entire contents copyright © by FALSOFT, Inc., 1991. **THE RAINBOW** is intended for the private use and pleasure of its subscribers and purchasers and reproduction by any means is prohibited. Use of information herein is for the single end use of purchasers and any other use is expressly prohibited. All programs herein are distributed in an "as is" basis, without warranty of any kind whatsoever. ● Tandy, Color BASIC, Extended Color BASIC and Program Pak are registered ® trademarks of the Tandy Corp. ● Subscriptions to **THE RAINBOW** are $31 per year in the United States. Canadian rates are U.S. $38. Surface mail to other countries is U.S. $68, air mail U.S. $103. All subscriptions begin with next available issue. ● Limited back issues are available. Please see notice for issues that are in print and their costs. Payment accepted by VISA, MasterCard, American Express, cash, check or money order in U.S. currency only. Full refund after mailing of one issue. A refund of 10/12ths the subscription amount after two issues are mailed. No refund after mailing of three or more magazines.

THE RAINBOW

Editor and Publisher
Lawrence C. Falk

Managing Editor Cray Augsburg
Associate Editor Sue Fomby
Copy Editor Rob Moore
Submissions/Reviews Editor Tony Olive
Technical Editor Greg Law
Technical Assistants Ed Ellers, Gregory Shultz
Editorial Assistant Julie Hutchinson
Contributing Editors
William Barden, Jr.
Tony DiStefano,Martin Goodman, M.D.
Eddie Kuns
Art Director Heidi Nelson
Designers Sharon Adams, Teri Kays, Debbee Diamond
Consulting Editors Judi Hutchinson, Laurie D. Falk
Typesetter Debbee Diamond

Falsoft, Inc.

President Lawrence C. Falk
General Manager Peggy Lowry Daniels
Asst. General Mgr. for Finance Donna Shuck
Admin. Asst. to the Publisher Kim Thompson
Editorial Director John Crawley
Director of Creative Services O'Neil Arnold
Chief Bookkeeper Diane Moore
Dealer Accounts Judy Quashnock
Asst. Gen. Manager For Administration Sandy Apple
Corporate Business Technical Director Calvin Shields
Customer Service Manager Beverly Bearden
Customer Service Representative Patricia Eaton
Chief of Printing Services Melba Smith
Chief of Prepress and Dispatch Tim Whelan
Business Assistant Wendy Falk Barsky
Chief of Building Security and Maintenance Lawrence Johnson
Asst. General Manager for Advertising, Development and Production Ira Barsky
Advertising Representatives Belinda Kirby, Kim Lewis
Advertising Assistant Carolyn Fenwick
(502)228-4492

For RAINBOW Advertising and Marketing Office Information,see Page 65

Letters to the RAINBOW

Living and Learning

Editor:

I have been an employee of Radio Shack for 14 months. I am the facility manager for the Computer Center in McAllen, Texas. There have been many items of interest and education since my employment with Radio Shack. However, the one that has earned my respect — albeit begrudgingly — is the CoCo world. Like many individuals who had no idea of what the CoCo is or who believed it to be an early (and glorified) Nintendo system, I find myself amazed by the capabilities of the CoCo and those who use it. For the first three months of my Radio Shack employment, I would not even glance through your magazine. I was very foolish. But from the moment I first looked through your publication I gained a greater understanding of the computer world. Computing is not limited to DOS or Xenix (Unix) or even PCs. I have realized that the CoCo (and others like the Commodore 64/128) have a very large user base producing very competent (if not original) programming. I have finally understood that no machine is obsolete as long as it is being used for computing.

I want to thank you for your fine work. Two of my greatest sources of knowledge relating to the world of Tandy are THE RAINBOW and PCM. It is a great pleasure to receive them each month.

Denny Church
McAllen, Texas

Where's the Caret Patch?

Editor:

I have an old gray CoCo and I am trying to type in "How Much Will it Cost to Buy on Time?" (October 1982, Page 70). Line 120 has ^-M at the end of the line and I cannot find ^ on my keyboard. Also, are there swap meets, CoCo user groups or bulletin boards in my area?

E. Wood
4094 Lindig Lane
Santa Barbara, CA 93110

The ^ symbol is called a caret. It is generated by pressing the up-arrow key. Although you see an up-arrow character on the screen, the computer correctly interprets it as a caret.

"The Intercom" carries listings for CoCo clubs and bulletin boards. This (usually) bimonthly department last ran in May 1991 (Page 76).

Pictures and Sound

Editor:

I have a 128K CoCo 3 and I'm looking for a scanner device that copies a picture from paper and draws it on the graphics screen. Also, I'm looking for a sound (voice) digitizer program or device to connect to my CoCo 3 that allows me to change the pitch (bass) of the voice, and that has sound effects.

James Ruth
128 Seymoure Avenue
Newark, NJ 07108

The Flipped Disk

Editor:

I am a retired electronics engineer and celebrated my 78th birthday last month. I have subscribed to THE RAINBOW since July 1984 and keep every copy within arm's reach. I am interested in the recent comments about using both sides of a disk in a one-sided drive by flipping the disk over. I have been doing this for at least five years and have had no problems whatsoever. At first, I double-punched the disks as Bill Swartz outlined in his letter to THE RAINBOW in April. But three or four years ago, BASF Corporation Information Systems (Crosby Drive, Bedford, MA 01730-1471) started manufacturing and selling prepunched flippies through the BEST Company, at least in California. These disks are occasionally on sale for as low as $4.95 for a box of 10. I can't understand why other companies have not followed suit.

Floyd Keirnan
Citrus Heights, California

We received several replies to the "quest for flippies" topic. More information about BASF's disks can be found in Lonnie's column this month (Page 8). Thanks to all of you for helping out.

Reviewing Reviews

Editor:

Thank you for the review of my game, *Honor Quest*. The comments were very helpful. Two changes are in order: I no longer call my company Valkyrie Software, and the price of the game has been changed to $16.50. The $2 shipping and handling charge is still in effect. I accept only checks or money orders, which should be payable to me. Please do not call my company Valkyrie Software anymore as I have closed my business account.

SUMMER SALE

SOFTWARE

Word Power 3.3: Power packed word-processor. Fast, Maximum Text Memory, 40/80 display, HELP Screen, Graphics, works with all printers, 80,000 Spell Checker, Punctuation Chkr. *The Best. Rave Reviews.* See Older Issues for more details. **$69.**

Color Schematic Designer: **$24**
RGB Patch: **$15** Screen Dump: **$15**
Maillist Pro:**$15** Comp. Checkbk:**$15**
Home Bill Manager:**$15**

ADOS 3:**$24** Ext. ADOS 3: **$29**
Smartwatch RTC: **$29** 24-to-28: **$10**

CoCo Max III: **$39** Fonts(95): **$29**
MAx 10: **$34** Fonts (36): **$14**
CGP220/NX1000 Color Driver: **$14**
Max Edit: **$14** SP Checker: **$14**

CoCo Graphics Designer: **$19**
Label Designer: **$19**
Picture,Font,Border Disks : **$7.50** ea

CoCo Util II: Xfer programs between IBM & CoCo. Req. 2 drives. **$39**
Xenocopy: xfer between 300 computers .**$79**

Autoterm: **$34** Vterm: **$39**
Telewriter 64: **$57**
VIP Database III:**$69** Calc III: **$69**

GAMES

The Quest for Thelda: **$34**
Contras:**$34** Crystal City: **$34**
Sinistaar:**$34** Kyum Gai: **$29**
(Other Sundog Games Also Available)
Treasury Pack #1,#2 & Space Pac (8 Games ea): **$29.95** each Pack.
Slots & Cards:$39 Wizd Castle:$10

BOOKS

500 Pokes, Peeks & EXECs: $16
Supplement: $9 300 Pokes: $19
All 3 Pokes, Peeks Books: $39
Color Basic Unravelled: $39
Disk Basic Unravelled: $19
Super ECB Unravelled: $19
All 3 for $49

CoCo 3 Service Manual: **$39** 2: **$29**
Multipak Service Manual: **$19**
Assembly Language Prog: **$18**
Addendum (for CoCo 3): **$12**
Full Turn of Screw (Disto): **$19**
Comp. Rainbow Guide to OS9:$19
Compl. Rain. Guide to OS9 Dsks:**$29**
Rainbow Guide OS9II:$19 Dsk:**$19**
Full Turn of the Screw: **$19**
Inside OS9 Level II: **$29**

Musica II: $29 **Lyra**:$49
Coco Midi Interf:$99 Software:**$59**

OS9 SOFTWARE

From Alpha Software .....
Data Window: **$59** Data-Merger:**$19**
Presto Partner:**$29** Level II Tools:**$24**
Disk Manag. Tree:**$29** Zapper: **$19**
Multi-Menu:**$19** Warp I:**$34**
OS9 Level II BBS:**$29**

From Burke & Burke.....
RSB: $39 EzGen:$19 Wild Card:$19

Other OS9 Software...
GSC File Xfer: **$44.95** SDISK 3:**$29**
OS9 RAMDISK (512K & 1MEG):**$29**
Screen Print Util.: $19 Menu Utill:$19
Point-&-Shoot File Selection:**$19**

HARDWARE

512K UPGRADE: The absolute best. No soldering. 120ns chips. Low-heat design. Comes with **picture** instructions & software (512K Ramtest/disk/Lightning, OS9 RAMDISK & Backup). **ONLY $79**. 0K Board:$39
1 MEG: $179 (0K: $129)
64K Upgrades for CoCo II: $29

MAGNAVOX 1CM135 RGB Color Monitor w/ Tilt, Swivel & 2 Yr. Warranty. **INCLUDES** CoCo 3 RGB Cable, Composite Cable Set & IBM Cable. Only **$298**

Disto Mini Controller: **$74**
Disto Super Controller: **$99**
Disto Super Controller II: **$104**
4-in-1 Board: $109 3-in-1: **$74**
RS232 Super Pack: **$54**

All our drives are TOP QUALITY BRAND NEW Double-Sided Drives with full 1-yr warranty. Our Drive 0 & 2 systems include Case, PS, Drive, controller, official RSDOS 200pg manual & $60 software.

Drive 0: **$199** 2 Drive Sys.: **$299**
1 Drive Cable:$16 2: $22 4:$34
Bare 51/4" Drive: $79
FD501 2nd Drive Upgrade Kit:**$99**
FD502 2nd Drive upgrade Kit:**$109**
Toshiba 3 1/2" Drive: **$79**

20 MEG Hard Drive System: **$459**
40 MEG Hard Drive System: **$549**
All our hard drive systems are complete read-to-run system for use under Basic & OS9.
CoCo XT: **$69.95** w/ RTC: **$99.95**
CoCo XT ROM: **$19.95**
HYPER IO: **$29** HYPERIII: **$12**

512K COCO 3: $229

Intronics EPROM Programmer: **$129**
Eraser: **$49** Both for **$154**

Keyboard Extension Cable: **$39**
CoCo 3 Keybd. **$39** w/ Cabl: **$69**
CoCo 2 Keybd **$29** w/ Cabl: **$49**

Zoom 2400 Modem w/ 7yr warr: **$99**
Communications Extravaganza 2400 w/ Modem, Softw., Cable: $149

Magnavox RGB Cable: **$19**
Serial-to-Parallel Interface: **$39**
15" Sheilded Multipak Extension:**$36**
40-pin Y Cable: **$34**
RGB Analog Extender: **$19**
Modem Cable (4 - 25 pin): **$15**
RS232 2 Position Switcher: **$29**
Hi-Res Joystick Interface: **$11**
Advanced Gravis Joystick: **$59**
Multipak Locking Plate: **$8**
Star Ribbons: **$8.50** Color: $12.95

RSDOS 2.1 Chip: **$29.95**
68B09E Chip: **$14** GIME Chip:**$39**
Multipak PAL Chip w/ instructions: **$15** (specify Multipak Model #)

MICROCOM SOFTWARE ●1387 Brighton Henrietta Town Line Rd ●Rochester,NY 14623

VISA MasterCard AMERICAN EXPRESS DISCOVER

To Order: All orders $99 & above (except Printers, Drives, Monitors, Computer) shipped 2nd Day Air at no extra Charge in Continental US. We accept Visa,MC,Discover,Amex (3% sur), check, MO & School PO's. COD Orders (<$100) within US add $5 extra. Please add 5% shipping (min $3) S&H in US & 10% (min $5) for Canada, Alaska & PR. All foreign orders except Can. pay actual shipping charges (min $5) . NYS residents please add sales tax. Monitors ($12 S&H/$40 in Can.); Drives ($10 S&H/$30 in Can); Computers ($8 S&H; $25 in Can).

For Orders (10-5) pm M-Sat: 1-800-654-5244. Tech Info & Order Status (3-5 pm): 716-292-1786

When I started writing the game back in 1988 it was a good idea, but in the two years it took me to finish the game it was outdone by other, better games. *Honor Quest* is quite vast, and after a short time of playing, the player loses less frequently. It is still an excellent game and, although not up to the standards of games like *Ultima*, it is intriguing and challenging. I agree with your reviewer that I overpriced it a bit. I am, therefore, reducing the price significantly.

Scott Settembre
Vestal, New York

CoCo Radio

Editor:

I've had a CoCo 3 for five years and I am starting a new hobby: Ham radio. I want as much information as possible about connecting the CoCo to the radio via Packett, RTTY, etc.

I also want to know the equipment I need to physically connect the CoCo to the radio and software to make it work. Please include information as to where I can purchase the suggested items and what is considered a good price. I appreciate any help you can give.

Gordon McLellan
8 Oxford Court
Manistee, MI 49660-1642

For a start, read "CoCo and Amateur Radio: A Natural Combination" by Steven Ford (November 1989, Page 44) and Mr. Ford's update on Page 22 of this issue.

Kudos

Editor:

I want to share with RAINBOW readers an experience I recently had with MusicWare. I ordered a copying program from Lester Hands but could not get it to work because of my computer setup. I sent Mr. Hands a letter explaining the trouble, and about 10 days later I received a modified copy of the program that works with my system. I am very pleased about this, as I have been in past dealings with MusicWare. I am an avid user of *Lyra*, and I feel better knowing I can deal directly with its creator. After all, who knows a program better than its creator? I hope Mr. Hands is around for a long time.

Eddy Gene Stephenson
Huntington, West Virgina

Homebrew Multi-Pak Help

Editor:

I am in the process of building my own Multi-Pak-like interface for my 128K CoCo 3. I want to use a real-time clock and have Disk BASIC running in the background. This unit will be different since it will house the drive controller and DC Modem Pak plus Orchestra-90CC within a single case, in addition to providing two other slots for future expansion. This interface will be for personal use and not for resale.

Can I remove voltage from a ROM pack and leave the data/address lines still hooked up when switching to another ROM pack or is there more to it? Without spending hundreds of dollars on bus expansions and books, could you give me a brief description on how the Multi-Pak Interface works? For example, what pins are switched? Also, I heard that Radio Shack is doing away with the CoCo. Have you heard anything about this?

Jon Money
4679 S. Rockford
Tulsa, OK 74105

For information on how the Multi-Pak Interface works, see the February 1985 (Page 56) and May 1988 (Page 168) installments of "Turn of the Screw" by Tony DiStefano.

Last we heard, production of the CoCo has stopped. But you know, it's nearly impossible to catch the end of a Rainbow.

Program Errors

Editor:

I have had my subscription to THE RAINBOW for several years now and enjoy your magazine very much. But lately I have had problems with what check out to be perfect programs. I get an Illegal Function Call error when the program reaches a certain point. Up until the time the error message stops the program, the program works perfectly. On programs that make a printout, even though I have the same printer as the program calls for, my printer only prints gibberish in the form of graphics symbols.

Is this problem in my computer? If so, where is it? I have returned it to Radio Shack (where I have a service contract) and they claim there is nothing wrong. I have checked the programs closely and they agree with *Rainbow Check Plus*. I hope you can help me solve this problem.

James F. Sayenga
3 D-21 Villa Interamericana
San German, PR 00753

FC errors are generally caused by function arguments that are out of range (too big or too small for the function in question. An example is `PMODE 5,1`. *Check the line reported by the FC error message, list the variables used, then check all occurrences of those variables in the program to ensure they are accurately manipulated. An excellent article, "Escape from the Bug Zone" by Eugene Vasconi, appeared on Page 58 of the January 1987 issue.* Rainbow Check Plus *is not infallible — certain typos may result in "valid" Check Plus values.*

The printer problems you are experiencing seem related to incorrect baud settings. In addition to making sure your printer is supported by a given program, make sure the baud is set to match that used by the program.

High-Speed Blues

Editor:

I have subscribed to this fantastic magazine since 1986 and enjoy it very much. I encountered a problem with one of my games, called *Solitaire*. I tried to change it to use the high-speed poke (`65495,0`) and it worked fine.

Then I wanted this game to backup to my destination disk and then something went wrong. The first few lines disappeared and a different line came up which I cannot delete from the program. As you can see from the listing I sent, a lot of "garbage" has mysteriously appeared at the beginning of the program, too.

Manfred Klinger
6633 W. Harrison Avenue
Milwaukee, WI 53219

Chances are you added the high-speed poke, tested it, then saved the altered program to disk, without adding the slow-down poke or manually slowing the computer down first. Often in this case, the saved file contains garbage that cannot be removed. The file is permanently garbled. If you have an unaltered backup copy, pull it out and try again.

Entering OS-9 Listings

Editor:

I want to use some of the OS-9 program listings in your magazine. Could you please tell me how I go about entering these listings? Do I use an editor/assembler, or is there some other program I have to use?

Brian Dexter
P.O. Box 72
Brooklyn, NS B0J 1H0
Canada

Use OS-9's `edit` *or* `build` *command, or an OS-9-based text editor to enter the program listings. Then you must compile the program, according to it's type, using the OS-9 assembler, C Compiler or BASIC09. If you are just starting out, we encourage you to experiment with BASIC09 first.*

CGP-220 Support

Editor:

I've been a faithful reader of THE RAINBOW since its very early days, and now I've added a PCM subscription. I still use my Color Computer a lot, but I also own a non-Tandy IBM-compatible. I have a Tandy CGP-220 Color Ink Jet printer as part of my system. For the Color Computer, I own a

couple of different printer drivers that print .MGE and .CM3 graphics. I haven't seen anyone sell a CGP-220 color driver to print .GIF graphics using compatibles. Can you possibly give me any help in this matter?

Steven Ostrom
12612 Cedar Lake Road
Minnetonka, MN 55343

We are unaware of any program that allows you to create .GIF screen dumps on the CGP-220 with an MS-DOS machine. Perhaps another reader can offer a solution.

OS-9 Typewriter

Editor:

Here's another trick for those who want to use their CoCo keyboards as typewriters. If you have the OS-9 operating system, you can play a trick at the OS9: prompt. When the prompt is present, just enter

```
build /p
```

Anything typed after this is sent to the printer. Of course you must remember not to enter more letters per line than the printer width. This might be more useful than the BASIC line

```
10 INPUT A$:PRINT #-2, A$:GOTO10
```

or the pokes published in THE RAINBOW years ago:

```
POKE 360,162
POKE 361,191
```

I hope the mention of these three different methods also helps the writer from April 1991 who can't find this information when he wants it.

Charles Scanlon
Simsbury, Connecticut

How Does DOS Work?

Editor:

When the DOS command is entered, exactly what happens? Does CoCo look for any "invisible" files, similar to that of IBM during the boot? If CoCo looks for such files, in what language are these files written? How can I learn more about the operating system?

Hinh Phansavath
9267 Via Vista
Buena Park, CA 90620

The DOS command causes the computer to load everything stored on Track 34 of the disk in the currently selected drive. If the first two bytes of that data are $4F53 (the letters O and S in ASCII), the CoCo assumes the data from Track 34 is a machine-language program and begins execution at the third byte. For more information about how the DOS command works and how you can use it, see "A Special Use for the DOS Command" by Roger Schrag (November 1984, Page 140).

The OS-9 Bandwagon

Editor:

I have tried to get on the OS-9 bandwagon several times now, but I keep running into problems. I become frustrated and quit. I have tried Radio Shack's programs (Cat. #700-2331 and #26-3030) and *The Complete Rainbow Guide to OS-9* disk set. Recently, I purchased OS-9 Level II for the CoCo 3. When I purchased it from my local Radio Shack dealer, I asked to ensure it worked with a single-drive disk system. And I was reassured that it did. After about 10 hours of reading and experimenting, I still could not get it to configure.

Then I wrote to Tandy Corporation and asked them for some help — or a refund. I have not received any response to these requests.

I am now considering the purchase of IMS' MM/1 with their OS-9/68000 system, but I would like your opinion after reading Mr. Brownson's letter to THE RAINBOW. I received the information I requested from them three times — with postage due.

Patrick J. Huebner
N. 878 Hwy P
Oconomowoc, WI 53066

We have not yet received an MM/1 for evaluation. This is subject to change at any time, and we'll publish information on the machine as soon as we get one. In the meantime we are currently working on evaluations of the System IV from Delmar Company and the TC-9 from Frank Hogg Laboratories.

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

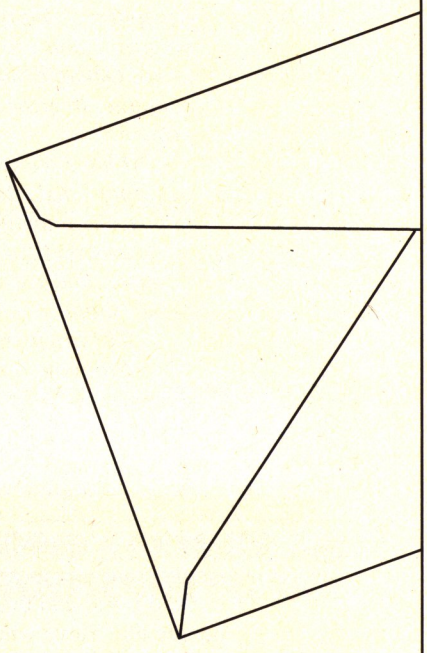
Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

About Your Subscription

Your copy of THE RAINBOW is sent second class mail. You must notify us of a new address when you move. Notification should reach us no later than the 15th of the month prior to the month in which you change your address. Sorry, we cannot be responsible for sending another copy when you fail to notify us.

Your mailing label also shows an account number and the subscription expiration date. Please indicate this account number when renewing or corresponding with us. It will help us help you better and faster.

For Canadian and other non-U.S. subscribers, there may be a mailing address shown that is different from our editorial office address. Send your correspondence to our editorial offices at Falsoft, Inc., The Falsoft Building, P.O. Box 385, Prospect, KY 40059.



Print#-2

Happy Anniversary to All of Us

Happy 11th Anniversary, actually, because it was 11 years ago this month that THE RAINBOW first made an appearance.

It wasn't much of a "magazine" back then, but we sure were proud of it. And an ever-growing CoCo Community was really proud of it, too, I think.

Our very first subscriptions came from CompuServe, where I had placed a note in *the* bulletin board (there were no SIGs and forums and things like that back then) saying anyone who had a Color Computer could subscribe to this newsletter I was starting for $12 a year. I also offered a "sample" to anyone who left me a message.

One of those people was Steve Ostrom of Minnetonka, Minnesota. I sent him a sample, and he sent me a check for a subscription by return mail. Do you believe Steve has been a loyal subscriber and a member of the CoCo Community ever since?

I received a letter from Steve the other day. For this, my 11th Anniversary column, I would like merely to quote him. Steve writes:

Editor:

THE RAINBOW has been my constant companion since I purchased my first Color Computer about 10 years ago. I've watched it grow from a small newsletter to a mega-sized magazine and grow from a mega-sized magazine to its current size today. Yes, I do mean grow! One only has to look at the wonderful content of your CoCo periodical to see that it continues to grow even though the number of pages is less today than a few years ago. Keep growing.

I have seen a couple of letters to THE RAINBOW recently concerning the lack of supply of "flippy" diskettes. Making your own from a "floppy" is possible but somewhat foolish due to possible damage and data loss.

BASF sells a "flippy" as a standard product. They are called BASF 2S/2D Reversible Diskettes and are further identified as BASF Part #54337! These are made by the manufacturer to be "flippies" and are guaranteed. Hard to go wrong with this one.

The last item I want to mention is a typo on Page 4 in the April '91 issue of THE RAINBOW. "For Rainbow Advertising and Marketing Office Information, see Page 95." How many pages were in the April '91 issue? Yes, even THE RAINBOW editors wish the magazine were bigger!

Steve Ostrom

Yes, we do, Steve, and thank you for your kind words. I will add, for what it is worth, that no single computer anywhere has the support the CoCo does.

And I will add that, most importantly, one of the main reasons for this support is because of people like Steve who take the time to help other members of our Community .

Long live CoCo.

— Lonnie Falk

DELPHI'S 20/20 ADVANTAGE, VISIBLY SUPERIOR

DELPHI	$20
GENIE	$124
COMPUSERVE	$120-$256

COST OF 20 EVENING HOURS OF DOWNLOADS AND CHAT

On DELPHI's 20/20 Advantage Plan, you get 20 hours of connect time each month for only $20. Additional time is only 2 cents/minute. No other full-featured online service even comes close!

And those are 20 hours of real online fun and productivity. Download files, chat with friends, send electronic mail, play multi-player games, and make travel reservations.

Join DELPHI now for only $39.95 and your first 20 hours are free. With your CoCo and modem:

- Dial 1-800-365-4636
- At *Username:* type **JOINDELPHI**
- At *Password:* type **COCO20**

DELPHI

THE WORLD'S PREMIER ONLINE INFORMATION SERVICE

800-544-4005 • 617-491-3393

Already a DELPHI member? Type **GO USING ADVANTAGE**

RS-232 Retrofit

by Marty Goodman

I have been asked many times about "problems" CoCo users have had using the Tandy Direct Connect (DC) Modem Pak (Cat. #26-2228). Most commonly I am asked, "How do I download using the Modem Pak?" and "How can I modify it to operate at speeds greater than 300 bps?" Other questions involve using the DC Modem Pak with disk drives and the CoCo 3's 80-column display.

The problems with downloading, the 80-column display and use with disk drives can be solved by using one of many third-party terminal programs that support the DC Modem Pak. V-Term, Delphiterm, and Mikeyterm (among others) include the ability to change the I/O port address to support this. However, the DC Modem Pak is still limited to 300 bps operation, which is sorely inadaquate for uploading and downloading. There is no way to increase the speed of the modem section inside the DC Modem Pak.

For the past several years, I have advised CoCo users with Disk BASIC terminal programs to discard or return their DC Modem Paks, then buy a 1200-bps modem to use with the serial port on the back of the CoCo. I further instructed users of OS-9 terminal programs to consider purchasing a Tandy, Disto or Orion RS-232 pack to allow operation at 1200 and 2400 bps, and higher transmission rates.

The DC Modem Pak is for use only as a 300-bps modem. RS-232 packs can be used with 1200-, 2400- and 9600-bps modems, and with null-modem cables at up to 19,200 bps, to rapidly and reliably exchange data between a CoCo and another computer. Needless to say, an RS-232 pack is a handy thing to have. Wouldn't it be great if there were a way to turn the Modem Pak into an RS-232 pack?

Over time, I thought more and more about such a conversion. The price of the DC Modem Pak got lower and lower — it is now around $10 at stores that have it in stock. The Tandy RS-232 Pak and the Multi-Pak Interface were discontinued and are impossible to find. The Disto/CRC replacement RS-232 pack doesn't work with Y cables or with the Slot Pak III (a replacement for the Multi-Pak).

Having observed long ago that roughly two thirds of the DC Modem Pak circuitry is nearly identical to that in the RS-232 Pak, I finally approached THE RAINBOW and a Color Computer vendor about the possibility of bringing to the public the information and means to convert DC Modem Paks. This article, and the products and services detailed later, are the result. With the information contained in this article, you'll be able to turn a Tandy DC Modem Pak into an RS-232 pack that works with the Multi-Pak, the Slot Pak III and standard Y cables. Before going into the details, I point out that this modification is destructive to the modem section of the pak. As such, *performing the modification most certainly voids any existing warranty for your DC Modem Pak.*

Modem Pak vs RS-232 Pak

Both the standard RS-232 Pak and the DC Modem Pak plug into the Color Computer via a 40-pin edge connector. Both use a 6551 ACIA and a 1.832-MHz crystal to convert signals into serial data. Both interface the 6551 to the Color Computer by directly decoding four ports, and both also allow the 6551 to send interrupts to the Color Computer via the *CART line. They even use the same small-scale logic chips (a 74LS133 and a 74LS04) to decode the four ports used by the 6551.

However, the DC Modem Pak sends the handshake and serial data signals from the 6551 directly to the on-board 300-bps telephone modem, while all the current RS-232 packs convert these signals to or from RS-232 voltage levels transmitted via a female DB-25 connector. In addition, the RS-232 Pak maps its 6551 to addresses $FF68 through $FF6B, whereas the Modem Pak uses addresses $FF6C through $FF6F. So the Modem Pak must be readdressed. Also, those who plan to use the converted Modem Pak with a Y cable must disable its ROM. This isn't too difficult, and I encourage all who use this information to do this, as well.

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

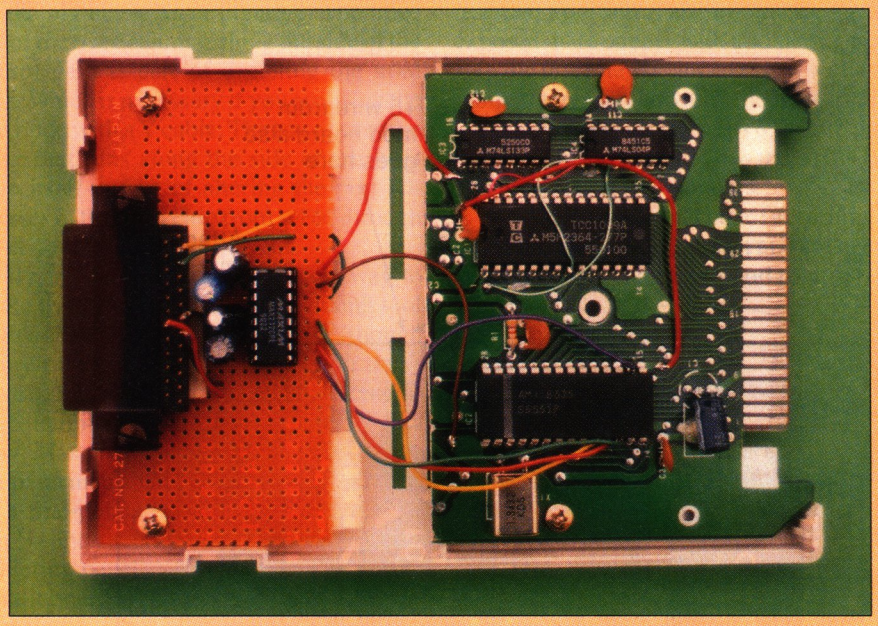


Photo 1

25 connector, a 16-pin DIP socket and four small capacitors. The socket will hold a MAXIM MAX232 or Harris/Intersil 1CL232 level-converter chip. The schematic for the circuit is shown in Figure 1. The approach you take in building the board is up to you, but I can offer some suggestions.

Use a *right-angle*, female DB-25 connector that is designed to be mounted on a printed circuit board. Mount this connector *upside-down* (so the pins stick up in the air) at the edge of your circuit board. This allows you to conveniently solder wires to the pins. I suggest this because few general-purpose circuit boards have holes in the staggered arrangement required for DB-type connectors.

Cut the circuit board so that it is exactly $3\frac{3}{4}$ inches wide and about 2 inches long. This way, it will fit snugly in the area where the modem currently resides in the lower half of the Modem Pak shell. Drill two holes in the board exactly where the mounting holes for the old modem used to go, so you can conveniently mount the circuit

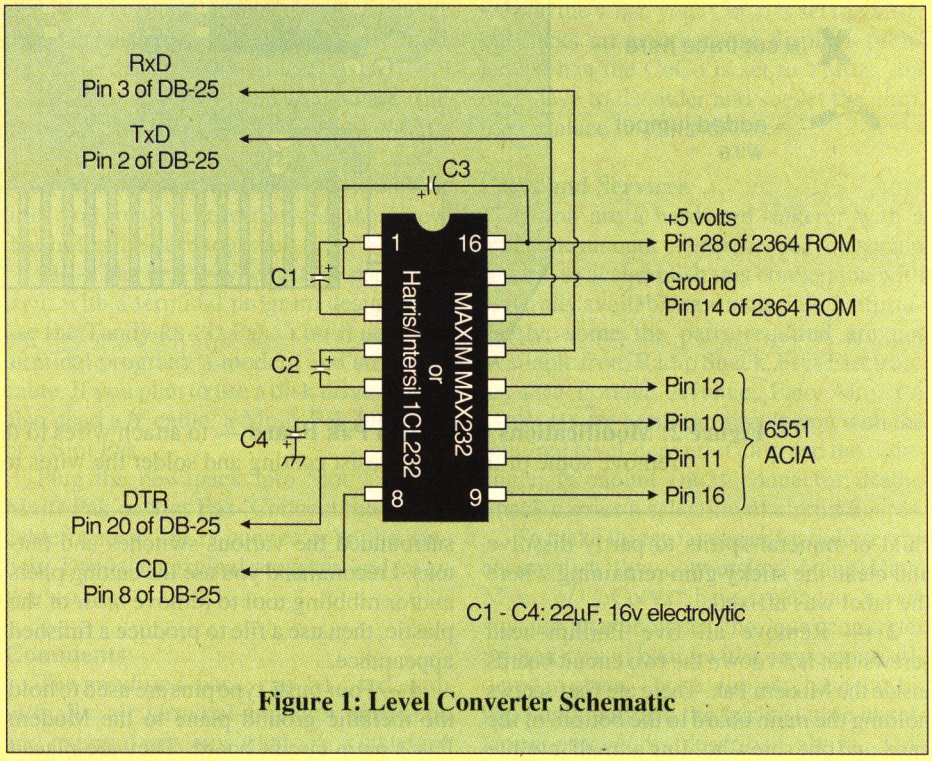


Figure 1: Level Converter Schematic

Tools Required

The listing provided here is meant to give the reader a reasonable idea of the minimum complement of tools required. As with any hardware project, however, experienced tinkerers may substitute other appropriate tools once they understand what needs to be done. You should have:

— soldering iron
— solder
— solder sucker
— medium phillips screwdriver
— cutting pliers
— flat file
— paper scissors
— Dremel moto-tool or Exacto knife
— wire
— tin snips or hacksaw

You'll need a pencil-type soldering iron for this project. It must have a fine-pointed tip and produce a tip temperature between 650 and 850 degrees Fahrenheit. The big irons used to make stained glass windows and soldering guns designed for working with 18-gauge wire are *not* acceptable — they will almost certainly destroy your DC Modem Pak board. A tool like the Radio Shack 15-watt pencil iron (Cat. #64-2051) will do the job, though higher-quality pencil irons are desireable if you can get one.

You should use 60-40 rosin-core solder for this project. (62-38 solder is also acceptable.) The solder you select should be fairly fine (22- to 25-gauge). Large-gauge, acid-core and no-core solder are *not* acceptable.

A solder sucker (such as Radio Shack Cat. #64-2098) is extremely helpful should you accidentally form a solder bridge between two pins on an IC during installation. I recommend the solder sucker highly and think little of using solder wicks for removing solder.

I recommend you use 30-gauge wire-wrap wire. However, 24-gauge stranded wire will work fine.

The Level-Conversion Circuit Board

To convert the DC Modem Pak, you must build a small circuit board with a female DB-

board in the shell where the modem used to be. Look at Photo 1 to see how the completed project looks.

Installation and Modifications

1— Open the DC Modem Pak case. On the bottom of the DC Modem Pak, near the 40-pin card-edge connector, is a black warranty label that conceals a Phillips-head screw. Peel off the label and discard it. Remove the screw and set it aside. If you want, use a paper towel and some lighter

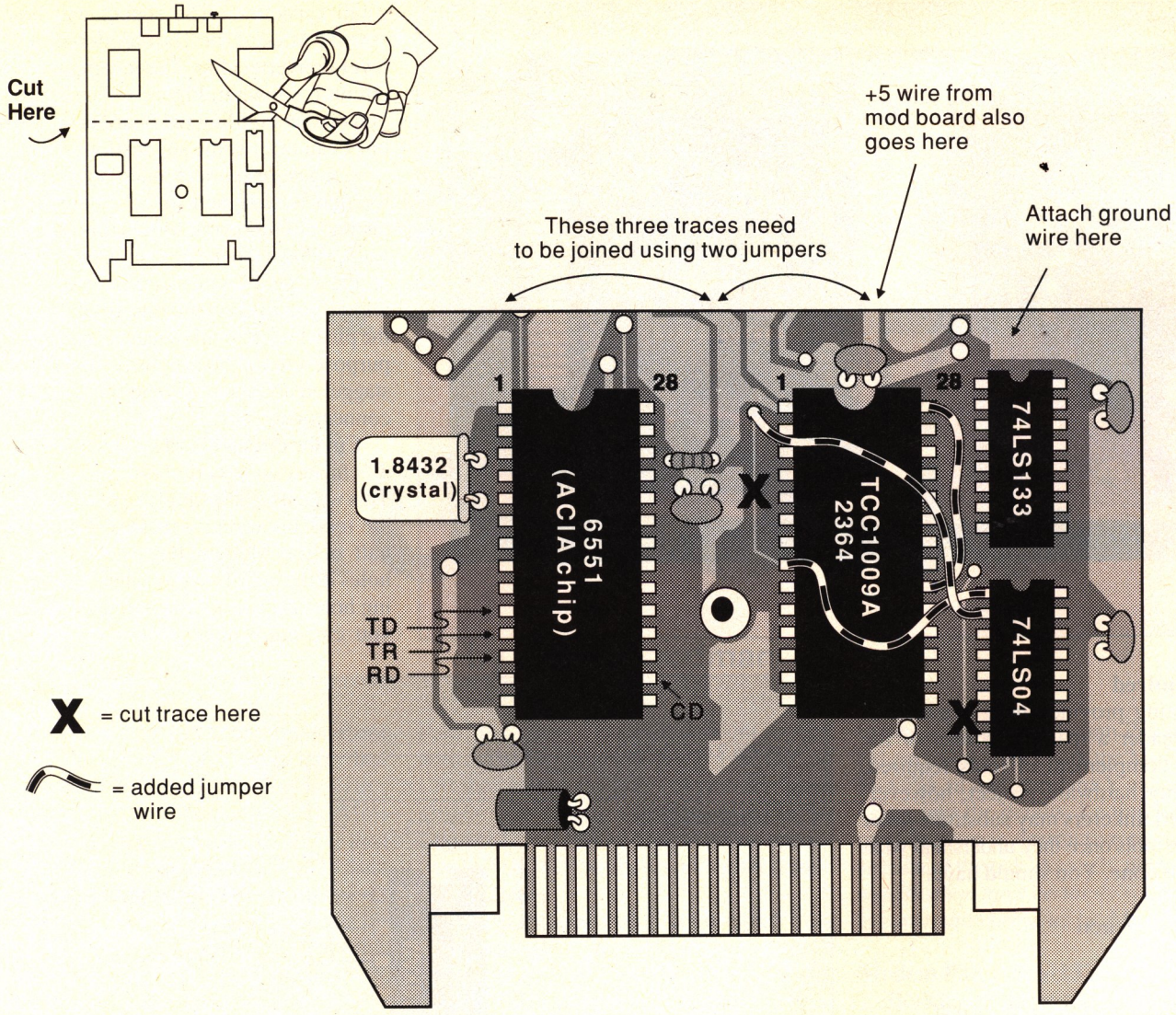


Figure 2: Modifications to Modem Pak Board — to attach wires to the circuitboard, use a knife to remove some of the solder-resist coating and solder the wires to the exposed copper.

fluid or mineral spirits to partly dissolve and clean the sticky gum remaining where the label was affixed.

2 — Remove all five Phillips-head screws that hold down the two circuit boards inside the Modem Pak. There are four screws holding the main board to the bottom of the case, and one screw holding a small satellite board to the top of the case. Save these screws. Remove the two circuit boards and set them aside for a moment.

3 — You now need to modify the top half of the Modem Pak case to allow for a DB-25 connector. Using cutting pliers, a nibbling tool, a file, or some combination of these tools, cut away the plastic on the top of the Modem Pak case so that it matches the trapezoidal cut in the bottom half (see Photo 2). While cutting, leave the slightly raised trapezoidal outline, but remove all the plastic within the outline that formerly surrounded the various switches and buttons. I recommend you use the cutting pliers and/or nibbling tool to remove *most* of the plastic, then use a file to produce a finished appearance.

4 — Four push-type pins are used to hold the metallic ground plane to the Modem Pak's main circuit board. They are placed roughly one pin in each corner. Remove the two pins that attach the ground plane to the *modem* end of the circuit board (the end with the phone connector and switches). Carefully bend the ground plane back from the circuit board. Use scissors to remove part of the ground plane — the cut is to be made *exactly* where the ground plane crosses the dotted line shown in Figure 2. Discard the removed portion of the gound plane and leave the remaining (attached) part laying flat against the circuit board. After cutting the ground plane, insulate the raw, cut end with a piece of transparent, frosted tape. Otherwise there is a small chance the cut edge may short to parts of the underside of the main circuit board.

5 — Again referring to Figure 2, use tin snips to cut the modem part of the circuit board away from the rest of the board. I *strongly* recommend using tin snips, for this is the easiest, fastest and cleanest approach. But if you do not have tin snips, you can use a hacksaw to make the cut. *Caution: Be very careful not to squash or crack any of the components on the circuit board if you use a vise to hold the board while cutting it.* With tin snips, you can simply hold the board in your hand and cut it like a piece of paper. Discard the modem portion of the board, as well as the attached LED board. (Or put them in your parts box, for they contain two nice LEDs, a useful varistor and a 600-ohm phone-line transformer.)

6 — Make the two trace cuts indicated by the big black Xs in Figure 2. The trace cut of the trace running along the side of the 74LS04 chip is part of disabling the ROM chip, which is necessary if you are using the cartridge with a Y cable. The trace cut of the trace that runs along the side of the ROM chip itself is part of altering the port addresses of the ACIA chip from $FF6C through $FF6F to $FF68 through $FF6B.

By far the quickest and easiest way to make trace cuts is by using a Dremel tool with a disk-like grinding bit on it (though many other bits will work). If you don't have a Dremel tool, you can use the Exacto-knife method to make the trace cuts. Here's how: Make two *deep* cuts in the trace about 1/16 of an inch apart. Then use the heated tip of a fine-pointed soldering pencil to heat the 1/16-inch section. It should stick to the soldering pencil, and you can lift it off the circuit board. While not as quick and easy as using a Dremel, this is a simple and professional way to make trace cuts.

7 — Solder a jumper between Pin 20 and Pin 28 on the ROM chip (see Figure 2). This completes the disabling of the ROM chip.

Now solder a jumper from Pin 1 of the 74LS04 chip to Pin 8 of the ROM chip. Also, solder a wire from the little plate-through hole/pad near Pin 1 of the ROM chip to Pin 2 of the 74LS04 chip. Again, refer to Figure 2 for details. These two additional jumpers complete the alteration to readdress the ACIA chip.

Here are some tips for soldering wires to pins on ICs: Heat the pin on the IC and tin it with a little bit of solder. Be very careful to not short two adjacent pins with a solder bridge. If you do short two pins, use the solder sucker to remove the bridge and try again to tin just the one pin. Now cut the exposed part of the jumper to a very short length (1/16 of an inch, or so, of exposed wire) and tin that tip of the wire. Heat the pin on the chip again with your soldering iron until the solder you put on it melts. Then touch the thoroughly tinned wire to the wet solder on the pin, and leave the two together with the iron there for another second or so until the solder on both flows together. Remove the iron, and hold the wire and pin together gently for several seconds while the solder cools. This "solder reflow" technique is the best way I know to solder wires to IC pins.

8 — Cutting off the modem part of the circuit board interrupts the power supply traces to parts of the remaining board, and two jumpers are needed to restore power there. Note the three broad, shaded traces shown at the very top of the remaining circuit board in Figure 2. (They are connected above the board by two lines with arrows at each end.) Using a Dremel or an Exacto knife, scrape some of the solder resist off a portion of all three traces. Tin the exposed, bare copper with a soldering iron. Join the three newly tinned traces with two jumper wires as shown by the lines in Figure 2. After performing steps 6, 7 and 8, you will have made a total of *two* trace cuts and added a total of *five* jumpers.

9 — Build the circuit board according to the circuit shown in Figure 1, and connect it

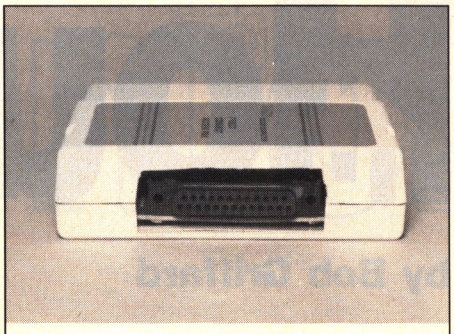


Photo 2

to the 6551 in the Modem Pak using the pin information given in the figure. Note that only six wires are used to join the "mod board" to the main board holding the 6551.

10 — Snap the top part of the case (the part you modified using a file and cutting pliers) onto the now completed RS-232 pack. After you successfully test the modified unit, you may want to reinstall the screw that holds the case together.

11 — The best way to test the pack is to try it with a terminal program designed to use the Tandy RS-232 Pak. You'll need the terminal program, a modem and an RS-232 cable. If you plan to use a disk drive, you'll also need a Y cable, a Multi-Pak Interface or a Slot Pak.

Plug the new pack into Slot 1 of the Multi-Pak or Slot Pak. Connect the RS-232 cable from its DB-25 connector to the modem. Load the terminal program, and away you go.

Comments

The modified pack can be used with virtually all terminal-emulator programs and external modems (that use a standard male-DB-25-to-male-DB-25 serial cable). Because the MAX232 and ICL232 chips have internal charge pumps and voltage inverters, they can generate sources of both plus and minus 10 volts internally to supply the RS-232 level converters. Yet they operate from a single +5-volt supply. This allows the pack to be easily used with a Y cable or the Slot Pak.

The conversion I have described supports only the RxD, TxD, CD and DTR lines of the 6551. These are the only lines actually used by the vast majority of applications for CoCo users. A few users may need to have support for some of the other RS-232 lines, such as DSR, RTS and CTS — especially if you use MNP or V.42bis error-correcting and data-compressing modems. These can be supported by adding another level converter chip and its accompanying capacitors. If you are supporting the DSR line, you must first disconnect Pin 17 of the 6551 from ground, where it is now connected, before you connect it to a level converter. If you are supporting the CTS line, you must also sever the connection on the Modem Pak board between pins 16 and 9 of the 6551. Additionally, I recommend you use a 10K-ohm pull-up resistor connected to +10 or +12 volts on the RS-232 side of the CTS input.

The 6551 ACIA chip used in the DC Modem Pak, like that used in the Tandy RS-232 Pak, is rated for operation with a 1-MHz 6809 system. It is not the 6551A chip that is rated for operation at 2 MHz. However, experience with the older RS-232 Paks has shown that, in practice, only a very few 1-MHz 6551 chips present problems working with a CoCo at 2 MHz. If your modified pack works fine when your CoCo is set to 1 MHz, but locks up or otherwise displays problems when the CoCo is set to 2 MHz, you may have to desolder and socket the chip, then replace it with a 6551A.

Parts and Services

If you are a hardware tinkerer with a moderate amount of experience, you should be able to accomplish this conversion with generally available raw materials. Unfortunately, some the parts required are not available from Radio Shack. Frys Electronics (340 Portage Avenue, Palo Alto, CA 94306; 415-496-6100) can supply you with the required level-converter chip and the right-angle, PC-mount DB-25 connector. Radio Shack carries a selection of circuit boards.

To make things far easier for tinkerers to accomplish this conversion, I and Dave Myers of CoCoPRO! have created a conversion kit that includes the level-converter printed-circuit board with components soldered in place. Those who purchase this kit need only perform the fairly simple installation procedures described above. This can save several hours of time, and avert a number of possible mistakes.

If you are not a tinkerer, take heart. You can send your old DC Modem Pak to CoCoPRO! For a fee, CoCoPRO! will install the conversion and return the converted pack to you. Finally, CoCoPRO! also sells the CoCoPRO! RS-232 Pak. This is a DC Modem Pak already converted as described in this article. Check the CoCoPRO! advertisement in this issue for pricing on these products and services. Happy hacking, and I'll see *you* on Delphi!

Making a list and checking it twice

House

by Bob Griffard

reating an inventory of all household items can be a tedious task. Some may ask, "Why bother?" Consider living without most of your possessions. Since tornadoes, hurricanes, fires and floods are not uncommon occurrences, an accurate inventory of household possessions can be very valuable when trying to recover the cost of these items.

House Inventory provides a means through which you can maintain a complete inventory of your household items. Items can be listed by room, year of purchase, and original cost. The program calculates a probable replacement cost for each item and tallies the inventory by room, listing the original cost and the replacement cost. Finally, it lists total cost and replacement cost for the entire house. Reviewing the total replacement costs might cause some of you to increase your insurance coverage.

Running House Inventory

Once the program is entered, saved and run, there is a delay of a few seconds while a PCLEAR0 is completed, and then the Main menu appears. The choices available are self-explanatory, and on the initial run, the obvious selection would have to be Add Items to Inventory (Option 1). You should familiarize yourself with the codes for the rooms of your house since entries require you to use the two-letter codes for Room Location. While not restricted by the program, the length of the item names should be less than 16 characters to avoid undue screen distortion. Remember to use easily understood abbreviations. Year Purchased is entered as a two-digit value (e.g. 91) since few of us purchased anything in the last century. Purchase Price should be entered as whole dollars, although the program can handle cents. To stop entering additional items, just type END when the next item's room location is requested. The program is currently limited to 500 items, but this can be altered by changing the DIM statements in lines 40 and 45, and the 500-limit value of N in Line 280.

To delete or change an item (Option 2 of the Main menu), you must know the item number. The item numbers appear on the printed output; they appear on the screen only when you select See Inventory and then File by Room Location. I find that the need to change or delete an item usually occurs when the contents of a specific room are being reviewed, and the item number has not been included on other screens to make better use of the 32-column display.

Program Notes

The probable replacement cost is computed in Line 1260 using the following factors: Year of purchase D(B); the current year T; and an inflation factor P. The values for T and P are set in Line 50. I have found a value of five percent annually a reasonable inflation factor for items purchased over 10 years ago. However, on such items as stereos, VCRs and computers, the costs have actually gone down. On high-value

---

Robert Griffard is a retired U.S. Air Force officer who supervised a computer facility supporting the military Command and Control function. He uses his Color Computer for correspondence and enjoys writing home-management programs for it. (See "Banishing Freezer Burn Blues" in the April 1987 issue.) Mr. Griffard can be contacted at 129 Stage Rd., Newport News, VA 23606-2040; (804) 596-8440. Please include an SASE when requesting a reply.

Inventory

items like silver or jewelry, the costs have risen higher than the computed replacement costs. For a complete household inventory, the values should almost balance.

The total number of rooms is set in Line 50 with the variable H. The DATA statement in Line 55 lists all the room codes. The meanings of these codes are shown in lines 780 and 790, and they are printed on the screen when you view the inventory of a specific room. The codes for printing at the end of a hardcopy are listed in lines 1140 and 1150. All of these codes, and their meanings, can be easily changed to customize the program for a specific house. For example, my wife and I are the only occupants of a four-bedroom house. One bedroom is now her sewing room and is coded SE in the household inventory. One bedroom is my computer room, coded CR.

The hardcopy is formatted for the narrow 4 1/2-inch roll paper used on the Radio Shack CGP-115 printer. The program does not, however, incorporate codes to skip the perforation. In fact, no special printer codes are used and the tab settings in lines 1060 and 1090 can be adjusted if you use wider paper. Personally, I find the narrow paper folds neatly to fit in my safe deposit box, and when the output is printed on normal 8 1/2-by-11-inch paper, there is ample space for adjustment notes.

I have used GOSUBs in calling the subroutines from the Main menu so that the FOR/NEXT stack pointers are automatically zeroed when the loops are interrupted. For example, if you choose See Inventory (Option 3) from the Main menu and then As Entered (Option E) from the submenu, a FOR/NEXT loop is set up in Line 680 to cycle through the data. After viewing a screen of items, you may want to return to the Main menu instead of viewing the entire inventory. Using GOTO rather than GOSUB requires zeroing the stack pointers, whereas the RETURN statement in Line 730 automatically zeros the pointers.

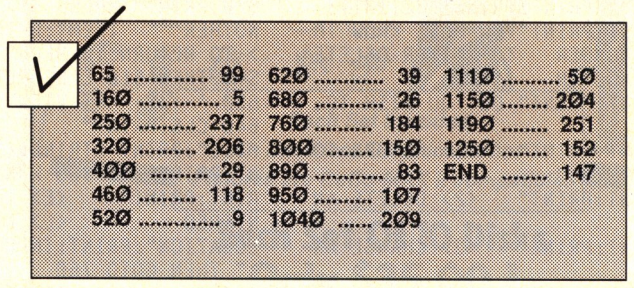
Kudos

I thank Chuck E. Brown, owner of West Bay Company, a software house in White Stone, VA. He reviewed the program and modified the screen displays to provide more appealing presentations.

Also, the code in Line 1280 was provided by Vernon Nemitz, author of *Full Screen Editor* and *Varisave* (reviewed in THE RAINBOW, April 1987), and is provided here with his permission. This code performs a PCLEAR0 from within the program, thus allowing the use of the additional graphics page without having to enter POKE 25, 14:POKE 3584,0:NEW prior to loading the program. The pokes in the statement fool the PCLEAR1 command into doing a PCLEAR0 instead. It works regardless of any previous PCLEAR statements, the current PMODE, and the status of any current graphics pages.

[*Editor's Note: After submitting* House Inventory *to us for publication, Mr. Griffard rewrote the program for the CoCo 3's wider screen, allowing the entry of remarks (e.g. serial numbers, brand names, etc.). Also, the output routine was modified for printing on standard fanfold paper. The version of* House Inventory *presented here works with any CoCo with 32K. Mr. Griffard will provide the CoCo 3 version to interested readers who send a stamped disk mailer and a formatted floppy to the address at the beginning of this article.*] ❑

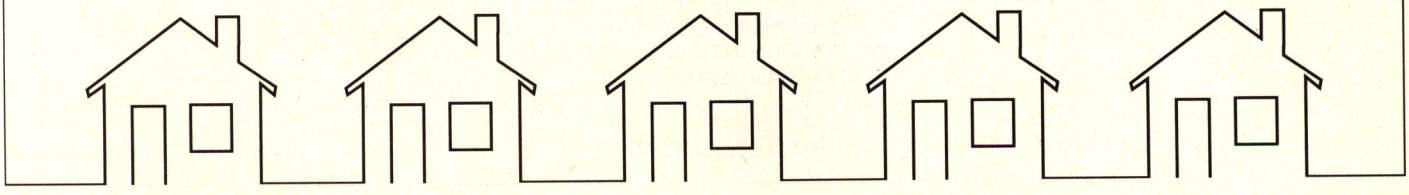
32K Disk



The Listing: HOUSEINV

```
5 'HOUSE INVENTORY
10 'WRITTEN BY BOB GRIFFARD
15 'COPYRIGHT JUNE 1991
20 'BY FALSOFT, INC.
25 'RAINBOW MAGAZINE
30 GOTO 1280
35 CLEAR 8000
40 DIM I$(500),L$(500)
45 DIMD(500),C(500):Z$=CHR$(134)
50 T=91:P=.05:H=18
55 DATA LR,DR,DE,KI,UT,B1,B2,CR,
SE,N1,N2,N3,HA,GA,AT,ST,PO,YD
60 '----------T=CURRENT YEAR P=A
NNUAL INFLATION RATE H=NUMBER OF
 ROOMS
65 '--------ROOM CODES ARE IN
```

```
    LINES 1230 & 1240 AND IN
    LINES 2070 & 2080
70 '-------HARDCOPY PRINT FORMAT
TED FOR 4 1/2 INCH ROLL PAPER
95 '---------MAIN MENU
100 CLS:PRINT"        HOUSE INVE
NTORY":PRINTSTRING$(32,134);
110 PRINT"ITEMS IN INVENTORY= ";
N
120 PRINT" DO YOU WANT TO:"
130 PRINT:      PRINT TAB(3)"1>
ADD ITEMS TO INVENTORY"
140 PRINTTAB(3)"2> DELETE OR CHA
NGE AN ITEM"
150 PRINTTAB(3)"3> SEE INVENTORY
"
160 PRINTTAB(3)"4> PRINT INVENTO
RY"
170 PRINTTAB(3)"5> LOAD INVENTOR
Y FROM DISK"
180 PRINTTAB(3)"6> SAVE INVENTOR
Y TO DISK"
190 PRINTTAB(3)"7> QUIT"
200 PRINT:PRINTSTRING$(32,131);:
INPUT" INPUT CHOICE (1-7) ";A
210 ON A GOSUB 260,340,640,950,1
180,1220,240
220 GOTO100
230 '----------QUIT PROGRAM
240 CLS:PRINT"        QUIT THE PR
OGRAM":PRINTSTRING$(32,134):INPU
T" ARE YOU SURE y/n ";R$:IF R$="
Y" THEN CLS:END:ELSE RETURN
250 '----------ADD ITEMS TO LIST
260 CLS:PRINT"        ADD ITEMS T
O LIST":PRINTSTRING$(32,131);
270 PRINT" TYPE end TO STOP ENTR
IES."
280 N=N+1:IF N=500 THEN GOTO 320
290 PRINTZ$"item"Z$"no"Z$;N:PRIN
T:INPUT" ROOM LOCATION: ";E$:IF
E$="END" THEN 310
300 L$(N)=E$:INPUT" ITEM NAME: "
;I$(N):INPUT" YEAR PURCHASED: ";
D(N):INPUT" PURCHASE PRICE: $";C
(N):GOTO 280
310 N=N-1:RETURN
320 PRINTZ$Z$Z$Z$"sorry"Z$Z$Z$"t
he"Z$"file"Z$"is"Z$"full"Z$Z$Z$;
Z$=CHR$(128):SOUND150,3:FORX=1TO
3000:NEXT:GOTO 310
330 '----------DELETE AN ITEM
340 CLS:PRINT"      DELETE OR CHA
NGE ITEM":PRINTSTRING$(32,131);
350 PRINT:PRINT"YOU MUST KNOW TH
E ITEM NUMBER    TO EITHER DELETE
 OR CHANGE AN    ITEM."
360 PRINT:PRINT" DO YOU WISH TO:
"
370 PRINT:PRINT"    <1> RETURN TO
 MASTER MENU"
380 PRINT:PRINT"    <2> DELETE AN
 ITEM"
390 PRINT:PRINT"    <3> CHANGE AN
 ITEM"
400 PRINT:INPUT" INPUT YOUR CHOI
CE (1-3) ";S:IF S=1 THEN RETURN
ELSE IF S=2 THEN 430 ELSE IF S=3
 THEN 510
410 IF S=1 THEN RETURN ELSE IF S
=2 THEN 430 ELSE IF S=3 THEN 510
420 '----------CHOICE: DELETE AN
 ITEM
430 CLS:PRINT"        DELETE AN
ITEM":PRINTSTRING$(32,131):PRINT
" ITEM NUMBERS HIGHER THAN THE
  DELETED ITEM CHANGE WHEN THE
  ITEM IS DELETED."
440 PRINT:PRINT" DELETE HIGHEST
NUMBERED ITEM    FIRST."
450 PRINT:INPUT" ITEM NUMBER TO
BE DELETED";K:IF K>N THEN PRINT"
INVALID ITEM NUMBER":FOR TT=1 TO
 1200:NEXT:GOTO470
460 B=K:PRINT" DELETED ITEM, ";I
$(B)",":PRINT" WAS LOCATED IN ";
L$(B):FOR B=K TO N:I$(B)=I$(B+1)
:L$(B)=L$(B+1):D(B)=D(B+1):C(B)=
C(B+1):NEXT B:N=N-1
470 INPUT" TYPE <1> TO DELETE AN
OTHER ITEM,     <2> TO RETURN TO
 MENU";J:IF J=1 THEN 430
480 IF J=2 THEN RETURN
490 IF J<>1 OR J<>2 THEN 470
500 '----------CHANGE AN ITEM
510 CLS:PRINT"        CHANGE AN
ITEM":PRINTSTRING$(32,131);:INPU
T" ITEM NUMBER TO BE CHANGED";X:
IF X>N THEN PRINT"INVALID ITEM N
UMBER":FOR TT=1 TO 1200:NEXT:RET
URN
520 B=X:PRINTB;L$(B);I$(B);D(B);
C(B):PRINT" DO YOU WISH TO CHANG
E":PRINT:PRINT"    <L> LOCATION
                   <I> ITEM NAME
                   <Y> YEAR OF PU
RCHASE             <K> COST":PRIN
T:INPUT" YOUR CHOICE IS: ";X$
530 IFX$="L"THEN 580
540 IF X$="I" THEN 590
550 IF X$="Y" THEN 600
560 IF X$="K" THEN 610
570 IF X$<>"L"ORX$<>"I"OR X$<>"Y
"OR X$<>"K"THEN RETURN
580 INPUT" NEW LOCATION: ";C$:L$
(B)=C$:GOTO620
590 INPUT" NEW ITEM NAME: ";C$:I
$(B)=C$:GOTO620
600 INPUT" NEW YEAR OF PURCHASE:
 ";G:D(B)=G:GOTO620
610 INPUT" NEW COST OF ITEM: ";G
:C(B)=G
620 PRINT" PRESS <1> TO CHANGE A
NOTHER     ITEM":PRINT" PRESS <2
> TO RETURN TO MENU":INPUT S:IF
S=1 THEN 510 ELSE RETURN
630 '----------VIEW THE FILE
640 CLS:PRINT"        VIEW THE
FILE":PRINT STRING$(32,131);:PRI
NT:PRINT" DO YOU WANT TO SEE:":P
RINT:PRINT"    <E> THE FILE AS E
NTERED          <L> FILE BY ROOM
LOCATION":PRINT:INPUT J$:IF J$="
L" THEN GOTO 760
650 '----------PRINT OF FILE AS
LISTED
660 CLS:PRINTZ$"inventory"Z$"lis
ting"Z$
670 PRINT"ROOM";TAB(8)"ITEM";TAB
(18)"YR";TAB(22)"COST";TAB(27)"R
EPL"
680 FOR B=1 TO N:GOSUB1260
690 PRINT L$(B);TAB(4)I$(B);TAB(
17)D(B);TAB(20)C(B);TAB(24)R
700 IF B/12=INT(B/12) THEN 710 E
LSE750
710 PRINT@480,"    cONTINUE    m
ENU  ";
720 R$=INKEY$:IF R$=""THEN720
730 IF R$="M"THEN RETURN
740 CLS
750 NEXT B:PRINTZ$"end"Z$"of"Z$"
file"Z$:INPUT" PRESS enter TO RE
TURN TO MENU    ";R$:RETURN
760 CLS:PRINT"      INVENTORY BY
 ROOM":PRINTSTRING$(32,131):PRIN
T" <1> ALL ROOMS":PRINT:PRINT" <
2> A SPECIFIC ROOM":INPUT Z:IF Z
=1 THEN 800
770 CLS:PRINT"        SELECT THE
 ROOM":PRINTSTRING$(32,131);:PRI
NT:PRINT"YOU MUST USE 2 LETTER R
OOM CODE"
780 PRINTSTRING$(32,140);: PRINT
"LR-LIVING RM","CR-COMPUTER RM",
"DR-DINING RM","SE-SEWING RM","D
E-DEN","N1-MASTER BATH","KI-KITC
HEN","N2-HALL BATH","UT-UTILITY
RM","N3-HALF BATH","B1-BEDROOM 1
","HA-HALLWAYS"
790 PRINT"B2-BEDROOM 2","GA-GARA
GE","AT-ATTIC","ST-STORAGE","PO-
PORCH","YD-YARD":PRINTSTRING$(32
,131);:INPUTR$:F$=R$
800 TC=0:CR=0:RC=0:TR=0:IF Z=2 T
HEN 820
810 RESTORE:FOR E=1 TO H:READ F$
820 V=0:GOSUB830:IF Z=2 THEN RET
URN ELSE NEXT E:GOTO930
830 FOR B=1 TO N:IF L$(B)<>F$ TH
EN 890
840 GOSUB1260:PRINT B;TAB(5)L$(B
);TAB(9)I$(B);TAB(22)D(B);TAB(26
)C(B):V=V+1:CR=CR+C(B):TC=TC+C(B
):RC=RC+R:TR=TR+R:IF V>=12 THEN
850 ELSE 890
850 V=0:PRINT@480,"   cONTINUE
    mENU";
860 R$=INKEY$:IF R$=""THEN 860
870 IF R$="M"THEN Z=2 :RETURN
880 CLS
890 NEXT B:IF CR=0 THEN 920
900 PRINT" TOTAL COST FOR THIS R
OOM WAS     $";CR:PRINT" REPLACE
MENT COST FOR THIS ROOM   IS  $"
;RC:PRINT@480," cONTINUE     mE
NU";:INPUT R$:IF R$="M"THEN Z=2
910 CLS:CR=0:RC=0
920 RETURN
930 PRINT" TOTAL FOR ALL ROOMS W
AS         $";TC:PRINT" REPLACEM
ENT COST ALL ROOMS IS   $";TR:PR
INT:INPUT" PRESS enter TO RETURN
 TO MENU";R$:RETURN
940 '----------PRINT THE INVENTO
RY LISTING
950 CLS:PRINT:PRINT" DO YOU WANT
```



```
:":PRINT:PRINT"   <1> ALL ROOMS"
:PRINT:PRINT"   <2> A SPECIFIC R
OOM":INPUT Z:IF Z=1 THEN 970
960 PRINT "WHICH ROOM ?-NOTE YOU
 MUST USE  TWO LETTER ROOM CODE"
:INPUT R$:F$=R$:GOTO1060
970 PRINT:INPUT" PRESS enter WHE
N READY ";R$
980 INPUT" INPUT MONTH/YEAR OF L
ISTING ";M$
990 PRINT #-2," HOUSEHOLD INVENT
ORY AS OF       ";M$
1000 PRINT#-2," REPLACEMENT COST
 COMPUTED AT    ";P*100;"%
1010 PRINT#-2," PER YEAR FROM YE
AR OF PURCHASE."
1020 PRINT#-2
1030 RESTORE
1040 TC=0:CR=0:RC=0:TR=0
1050 FOR E=1 TO H:READ F$
1060 PRINT#-2,"RM";TAB(10)"ITEM"
;TAB(23)"YR";TAB(27)"COST";TAB(3
3)"REPLACE"
1070 GOSUB1080:IF Z=2 THEN 1160
ELSE NEXT E:GOTO1130
1080 FOR B=1 TO N:IF L$(B)<>F$ T
HEN 1100
1090 GOSUB1260:PRINT#-2,L$(B);TA
B(5)I$(B);TAB(22)D(B);TAB(26);:P
RINT#-2,USING"$####";C(B);:PRINT
#-2,TAB(34);:PRINT#-2,USING"$###
#";R:CR=CR+C(B):TC=TC+C(B):RC=RC
+R:TR=TR+R
1100 NEXT B:IF CR=0 THEN 1120
1110 PRINT#-2:PRINT#-2," TOTAL C
OST FOR THIS ROOM WAS    $";:PRI
NT#-2, USING"$#####.##";CR:PRINT
#-2," REPLACEMENT COST THIS ROOM
 IS   $";:PRINT#-2,USING"$#####.
##";RC:CR=0:RC=0:PRINT#-2
1120 RETURN
1130 PRINT#-2:PRINT#-2," TOTAL F
OR ALL ROOMS WAS         $";:PRI
NT#-2, USING"$#####.##";TC:PRINT
#-2," REPLACEMENT COST ALL ROOMS
 IS   $";:PRINT#-2,USING"$#####.
##";TR
1140 PRINT#-2:PRINT#-2," LR=LIVI
NG ROOM,  DR=DINING ROOM,  DE=DE
N":PRINT#-2," KI=KITCHEN,  UT=UT
ILITY" :PRINT#-2," B1=MASTER BED
ROOM,   B2=GUEST BEDROOM":PRINT#
-2, " SE=SEWING ROOM,  N1=MASTER
 BATH":PRINT#-2," N2=HALL BATH,
 N3=1/2 BATH,  HA=HALL"
1150 PRINT#-2," GA=GARAGE,  AT=A
TTIC,  ST=STORAGE":PRINT#-2," PO
=PORCH,  YD=YARD  CR=COMPUTER RM
"
1160 PRINT :INPUT" PRESS enter T
O RETURN TO MENU";R$:RETURN
1170 '----------LOAD DATA FROM D
ISK
1180 CLS:PRINT"      LOAD DATA F
ROM DISK":PRINTSTRING$(32,131);:
PRINT:INPUT" WHAT IS DATA SOURCE
 DRIVE       NUMBER: ";DN:DRIVE(
DN):PRINT:INPUT" PRESS enter WHE
N READY ";R$:OPEN"I",#1,"HOUSEIN
V/DAT":IF EOF (1)=-1 THEN 1200
1190 INPUT #1,N:FOR B=1 TO N:CLS
:PRINT@233,Z$"loading"Z$"data"Z$
:LINEINPUT#1,I$(B):LINEINPUT#1,L
$(B):INPUT#1,D(B):INPUT#1,C(B):N
EXT B
1200 CLOSE#1:RETURN
1210 '----------SAVE DATA TO DIS
K
1220 CLS:PRINT"       SAVE FILE
ON DISK":PRINTSTRING$(32,131);:P
RINT" WHAT IS DESTINATION DRIVE"
;:INPUT DN:DRIVE(DN):PRINT:PRINT
" DATA WILL BE SAVED AS
  -HOUSEINV/DAT-":PRINT:INPUT" P
RESS enter WHEN READY";R$
1230 OPEN "O",#1,"HOUSEINV/DAT":
PRINT#1,N
1240 FOR B=1 TO N:CLS:PRINT@235,
"saving data"
1250 PRINT#1,I$(B):PRINT#1,L$(B)
:PRINT#1,D(B):PRINT#1,C(B):NEXT
B:CLOSE#1:CLS:PRINT" DATA HAS BE
EN SAVED TO DISK":PRINT:INPUT" P
RESS enter FOR MENU";R$:RETURN
1260 I=(T-D(B))*P:R=INT((I*C(B))
+C(B)):RETURN
1270 END
1280 POKE182,0:POKE183,PEEK(188)
:POKE184,0:POKE185,16:POKE186,PE
EK(188):POKE187,0:POKE188,PEEK(1
88)-6:PCLEAR1:POKE183,PEEK(183)+
6:POKE188,PEEK(188)+6:GOTO35
```


SUPER SUPER SPECIAL

All 530 Public Domain Programs-$145 Value
All 1,020 Subscription Programs-$260 Value
All 250 Graphic Pictures-$70 Value
ENTIRE PACKAGE Regularly $475

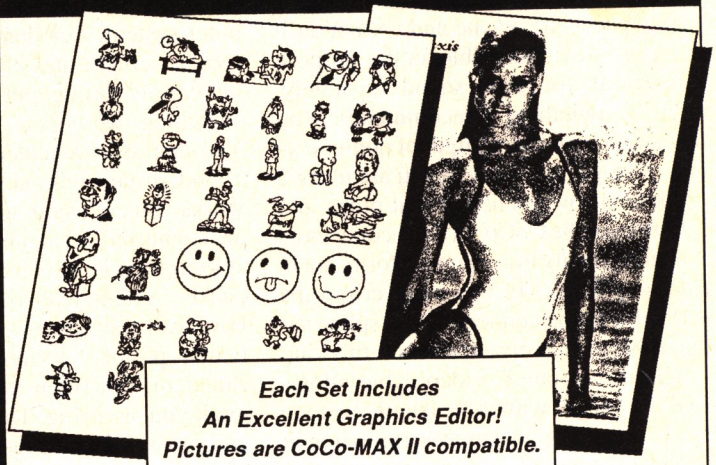
Now Only...

VISA MasterCard

$279.00!

SEE PAGE 57 FOR DETAILS

Over 250 Quality Pictures

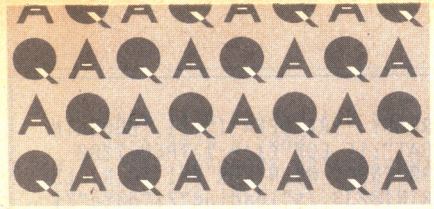


Each Set Includes
An Excellent Graphics Editor!
Pictures are CoCo-MAX II compatible.

Each Set Of 10 Disks
Only $35.00 !
Buy 2, Get One Free!

Set #1	Set #2	Set #3
Clipart	Celebrities	Adult Only
Space Pictures	Cartoon Characters	R-Rated
Animals	Great Graphics	Beautiful Women
More	More	

T&D Subscription Software • 2490 Miles Standish Dr., Holland, MI 49423 • 616-399-9648



Monitor Extender Cables

by Marty Goodman
Contributing Editor

When I extend the cable of my RGB monitor using a self-made extender cable, the picture quality deteriorates noticeably if I add more than about 18 inches of extension. Is there a way to make a longer video extender and not lose signal quality?

Ted Jaeger (TEDJAEGER)
Fayetteville, North Carolina

A I suggest you use ribbon cable for the extender cable — construct the cable so that every other wire of the ribbon cable is a ground wire. For a CoCo-type RGB cable, your cable's wires would be GND, Red, GND, Green, GND, Blue, GND, Sound, GND, HSync, GND, VSync and GND. You'll need a 13-wire ribbon cable for this purpose (11 wires if you send sound separately, which is something I recommend). You may need a very short length of non-every-other-wire-ground cable if you are using a 10-pin, dual-row connector that plugs into the bottom of the CoCo 3. (Such connectors are available only in a crimp-on form, not in solder-cup form.) In this case, crimp the short cable to the connector, and splice the main cable to it. In my experience, this kind of "alternate-ground" video cable allows excellent images with cable lengths up to 20 feet. This cable approximates a situation in which every signal is sent on a separate coaxial cable, but costs less and is less bulky.

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

Xmodem vs. Ymodem vs. Zmodem

What is the advantage of Ymodem over Xmodem? What is the advantage of Zmodem over Ymodem?

Tom Disch (BASCO)
Brookfield, Wisconsin

A Ymodem is an attempt to improve speed of data transmission over that of Xmodem when using packet switching networks such as Tymnet and SprintNet (formerly Telenet) to link to another computer system. Zmodem represents a more recent, refined and efficient approach to increasing throughput over such packet switching networks. The advantage of Ymodem over Xmodem or Zmodem over Ymodem depends on exactly which networks you are using, to which system you are connected, what time of day you use the system (that is, how heavily loaded is that packet system with other users), and on how well the implementation of the particular protocol (Xmodem, Ymodem or Zmodem) is written for the terminal program you are using. Thus, there is no general answer I can give to your question. However, I can give you "numbers" obtained in certain specific tests I have done with Delphi. In these tests, Ymodem proved, at 300, 1200 and 2400 bps, 10, 20 and 30 percent (respectively) faster for downloading than Xmodem. I used a PC-compatible, SprintNet, and was working late at night (low network and Delphi usage). In similar tests, I found that Zmodem provides about a 15-percent increase in the speed of downloading over Ymodem at 2400 bps.

Note that, if you are not going through a packet-switching system and are connecting to a single-user machine at the other end of the line, Zmodem offers almost no advantage in speed over lowly, ancient Xmodem (although it offers somewhat better performance in high line-noise situations). Note, too, that a bad implementation of Ymodem (such as the direct-to-disk Ymodem implementation found in *Greg-E-Term V2.5*) makes downloads take a lot longer than a good implementation (such as that found in *V-Term*). Both implementations work, but one is a lot faster than the other.

Getting back to your original question, it appears that if you are using Delphi at 1200 or 2400 bps, it is to your advantage to use Ymodem rather than Xmodem. Zmodem gives you a further speed increase, but in my experience this increase is only 15 percent, so the fact that Zmodem is currently not available to Disk BASIC CoCo users is not, in my opinion, any big deal. (I am told that *Ultimaterm 5.0*, a new release of the very full-featured Disk BASIC shareware program by Ken Johnston, features Zmodem. This release is scheduled for July of 1991.) Phillip Brown (THEFERRET) is currently beta testing working versions of `rz` and `sz` (Zmodem file-transfer modules) for OS-9 users on Delphi. For more information about the various protocols, see "Observing the Social Graces" by Tim Koonce (November 1989, Page 72).

Burning EPROMs

I want to burn a copy of ADOS *into an EPROM. A friend has a PC-compatible with an EPROM programmer. What is involved in bringing the ROM data file from the CoCo to the PC and making it suitable for the PC-based EPROM programmer?*

Tom Thomas (TOMTHOMAS)
Janesville, Wisconsin

First, you must bring the file over from the CoCo disk to a PC-compatible disk. You can do this in one of several ways. On the CoCo, you can use my COCO2MS conversion utility (THE RAINBOW, June and July 1986) to get the files in MS-DOS format. Or you can use any of several utilities written for MS-DOS (such as *Elite Xfer*, *Xenocopy* and *CoCo Util II*) that transfer the CoCo disk file to an MS-DOS-type floppy or hard drive. You can also dispense with disk-transfer utilities altogether and run terminal programs on both the CoCo and PC. Use a null-modem cable to link the two, and send the file from the CoCo to the PC using Xmodem or Ymodem. If the PC and CoCo are located away from each other, you can upload the *ADOS* data file from your CoCo to your workspace on Delphi, then later download it using your friend's PC.

Once you have the file in the PC, you need to condition it to a form compatible with PC-based EPROM programmers. You need to cut off the first five bytes of the file, then trim the file down to either $2000 bytes if it is an 8K *ADOS* or *ADOS-3* file or to $4000 bytes if it is an *Extended ADOS-3* file. This can be done quickly and easily using DEBUG on the PC. For example, say your file is called EPROM.BIN and that it is the data file for a $4000-byte *Extended ADOS-3* ROM. Enter DEBUG EPROM.BIN. At the Debug prompt (-), type M 105 4000 100 and press ENTER. This shifts the $4000 bytes starting at the sixth byte in the file down five bytes, effectively disposing of the first five bytes in the file. Then type R CX and press ENTER. You are shown the contents of the CX register and offered an opportunity to change that value. You will probably be shown that CX holds a value of $4100. Set it to $4000 by typing 4000 and pressing ENTER. Resave the file to disk by typing W and pressing ENTER. You have now conditioned the file. (Substitute $2000 for $4000 in all the above steps if you are conditioning a file for an 8K EPROM.)

If you want to burn a Motorola 68766 (24-pin, 8K-by-8) EPROM for your Tandy controller that does not have a 28-pin socket, but your friend's PC-based EPROM programmer has provisions for burning only 27-series chips, you can probably still burn the 68766. Use the following instructions to make an adaptor socket for the programmer. Position a 24-pin socket (preferably a ZIF socket) over a 28-pin header so that pins 1, 2, 27 and 28 of the header are not attached to anything. Pins 1 through 12 of the socket overlay pins 3 through 14 of the header, and Pins 13 through 24 of the socket overlay Pins 15 through 26 of the header. Now solder together all overlaying pins, except the pin pairs associated with pins 18, 21 and 24 of the 24-pin socket (pins 20, 23 and 26 of the header). Now run a jumper between Pin 18 of the socket and Pin 23 of the header, between Pin 21 of the socket and Pin 2 of the header, and between Pin 24 of the socket and Pin 28 of the header. This leaves pins 1, 20, 26 and 27 of the header unconnected. With such an adaptor, you can program a 68766 chip. This assumes the programmer supports 27512 chips and that you can override the V_{pp} setting of 12.5 volts normally associated with 27512 chips and set it to 25 volts. This is the case for the programmer software for the popular, inexpensive Sunshine brand EPROM programmer commonly used on PC-compatibles. One further detail: With the more recent revisions of the software for the Sunshine programmer, you can even tell the programmer that your buffer is only $2000 or $4000 bytes in size, instead of the $10000 bytes expected with a 27512 chip. Just use the Alter Target Zone option to set the buffer to start at $0000 and end at $1FFF, and set the EPROM target zone to start at $0000. Even if your software is old and you cannot override buffer size, there is no harm — you'll just be programming the chip eight times. Be sure to select the Intel algorithm when programming.

Burke & Burke
P.O. Box 733
Maple Valley, WA 98038

U.S. ORDER DESK: (800) 237-2409

INT'L & TECHNICAL: (206) 432-1814

OS9 Software (* >= 256K; ** >= 512K required):

WORLD CLASS CHESS* -- Use your Tandy Cyrus Chess cartridge under OS9 L2	$29.95
FILE SYSTEM REPACK 1.1 -- Popular disk defragmenter. NEW VERSION!	$29.95
FILE RECOVERY SYSTEM -- helps rebuild crashed disks	$24.95
R. S. B.* -- Real Disk BASIC for Level 2 (BASIC ROM required).	$39.95
EZGEN 1.09 -- OS9 bootfile editor	$19.95
CYBERVOICE (Software only)* -- Run your S/S SuperVoice w/ OS9!	$24.95
PERTASCII* -- Multi-user scrambled letter word game.	$19.95
WILD & MV -- Wildcard & move directory entry utilities.	$19.95

BASIC Software (* >= 256K; ** >= 512K required):

HYPER-I/O -- 16K Hard disk / big floppy BASIC. Specify B&B or DISTO hard disk	$29.95
DAGGORPATCH -- Disk patch for Dungeons of Daggorath.	$ 9.95

HYPER-I/O comes on floppy disk & is EPROMable. HYPER-I/O allows large floppy and hard disk directories, with good M/L compatibility. We recommend HYPER-I/O for BBS & BASIC use, but it may be incompatible with some of your commercial ML S/W.

VISA MasterCard

Affordable Color Computer Hardware:

CYBERVOICE -- Speech Synthesizer w/ OS9 software.	$99.95
COCO XT -- Adapts PC hard drives to CoCo. OS9 S/W included.	$69.95
COCO XT-RTC -- CoCo XT, with battery backed real-time clock.	$99.95
XT-ROM -- Boots OS9 from B&B hard disk automatically.	$19.95
4' Hard disk cable set (Extra long -- standard cables are 2' or shorter)	$17.50

News About Upcoming Products...

A few of the products you can expect to see over the next few months are the OSKenLook user interface for OS9/OSK; the PIXELBOX adapter that lets you use LogiTech ScanMan handheld scanners with the CoCo 3, and OSK ports of several popular Burke & Burke utility packages -- Chris

New Ego Killer!

World Class Chess lets you use your Tandy Cyrus Chess cartridge under OS9 Level 2. We've added mouse, disk, and windows support. Looks great, and plays a mean game of chess! Only $29.95. *(Cyrus Chess Cartridge available from TANDY Consumer Mail, P/N 26-3064, $29.95)*

WA RESIDENTS ADD 8.2% SALES TAX. U.S. COD's add $3.75. Min. U.S. shipping $4.00. Min. to Canada $5.00. Please allow 2 weeks for delivery. Overnight or 2nd- day available for in-stock items. Software upgrades $5.00 each w/receipt, including U.S. shipping.

Power Supply Capacity

Can a disk-drive power supply that is currently powering two 5¼-inch half-height drives be used to also power a 3½-inch drive?

Tom Thomas (TOMTHOMAS)
Janesville, Wisconsin

A The power capacity of disk-drive power supplies and the power requirements of individual disk drives both vary a great deal from drive to drive and power supply to power supply. Without making specific measurements on your power supply, there is no way I can be sure of the answer. However, as a rule of thumb, most dual-drive power supplies can power no more than two half-height floppy drives.

There are several ways to tell whether or not a power supply is adequate to deliver more power. The most crude method is to just hook things up and see if they work. Check to see if the voltage regulator devices get too hot to touch. A more precise test is to measure with a volt meter the input voltage to the 7805 and 7812 voltage regulators commonly used in such power supplies. The input voltage to the 7805 should not sag any lower than eight volts when you hook up all your drives. The input to the 7812 should not sag any lower than 14.5 volts when the drives are accessed, with the head of one drive stepping. Under these conditions, and assuming the outputs of the 7805 and 7812 are 5 and 12 volts, respectively, the power supply should be acceptable for the drives that are connected to it.

What Voltage for V_{PP}?

I have some 27256 EPROMs and I'm not sure whether their programming voltage is 12.5 or 21 volts. How should I proceed to program them?

Ernest N. Dotson, Jr. (ENDOTSON)
Marnet, West Virginia

A From the point of view of programming voltage, the 27256 EPROMs are the most beastly variety of EPROM made. While the majority have a V_{PP} of 12.5 volts, a few are made to be programmed at a V_{PP} of 21 volts. Worst of all, unlike the 2732s, 2764s and 27128s, which use an A suffix to distinguish between one of two standard programming voltages, the 27256 provides no such clue. (The presence of the A suffix indicates you should use the lower voltage: 21 volts for a 2732, and 12.5 volts for a 2764A or 27128A). Only by reading the manufacturer's spec sheet for the exact brand and part number of your chip can you tell in advance what programming voltage is proper. If you program a 27256 intended for 12.5 volts with a V_{PP} of 21 volts, you will almost certainly destroy it. Programming a 21-volt 27256 with a V_{PP} of 12.5 volts does not harm the chip — but it won't be successfully programmed. This information should tell you how to proceed with unknown 27256s. Try programming them at 12.5 volts first and, if that fails, proceed to 21 volts. For what it is worth, the vast majority of the 27256s I have seen require 12.5 volts. I have, however, encountered NEC and Fujitsu brand 27256s that require 21 volts.

Finally, a word of caution: If you use the Intronics EPROM programmer, you may have difficulty programming some CMOS-type EPROMs. I don't know exactly why this is, but I have heard several possible explanations. If you're using a CMOS 27256 (if it has a C between the 27 and the 256) and it fails to program at both voltages, this might not be due to an improper programming voltage or the chip being bad to begin with, but rather to some subtle problem some Intronics programmers have with CMOS chips.

Marty Tells a Tale

I recently relocated my faithful 8-MHZ MS-DOS computer from my upstairs office to my basement laboratory to be employed as the brains for my EPROM and PAL programmer. I started to set up a printer, but got sidetracked half-way through the process — I had connected the parallel-printer cable from the printer to the computer, but I did not plug the printer in or put any paper in it. For two weeks after that, I used the computer (which was sometimes on for an entire day) to program EPROM and PAL chips and had no apparent problems.

Then, I had occasion to print something using this computer. So I put paper in the printer, plugged it in, turned it on and sent the file (a dump of the contents of a PAL chip) to the printer. Nothing happened. I felt behind the computer to make sure the printer cable was firmly plugged into its connector. It was, so I again tried to print the file. Again nothing happened. I decided to check matters more closely.

I discovered that the parallel printer connector on my computer was not being used. My printer was plugged into the wrong connector. Worse, I noticed the printer cable (which had been connected for all of those two weeks) was rather warm and there was a faint, but ominous, smell of cooking phenolic circuit-board material rising from the back of my printer. But wait! PC connectors are standardized and keyed so as to be more or less idiot proof. IBM parallel-printer cables use a male DB-25 connector that connects to a female DB-25 connector on the computer. PC serial ports use male DB-25 or DB-9 connectors on the computer, so it is impossible to accidentally plug a standard IBM parallel cable into a standard IBM serial connector on the computer.

Where had I made my mistake? What had I plugged the printer into? It didn't take me long to discover that I had plugged the male DB-25 connector on the printer cable into a standard female DB-15, PC-joystick connector. This connector was supplying five volts on one of its pins, which was cooking the printer's parallel input. Although I had used an industry-standard DB-15 connector for the joystick port, I had neglected to install the little nuts on either side of the connector that would have prevented plugging in a male DB-25 connector.

What's the relevance of this story to CoCo users? If you are making your own setups or repackaging your CoCo, you must be especially careful in your choice of connectors for ports that go to the outside world. Even what seems like a foolproof assignment of connectors (as was the case above) may be vulnerable to a mixup. Even if you think you have a foolproof connector assignment, you should still be very careful to label all connectors and double check them when you hook up anything to make sure it is plugged into the correct connector. Nothing is foolproof, as I clearly demonstrated.

With the moral out of the way, how does this story end? The printer passed its self-test perfectly, but when I hooked it to the proper parallel port on the computer, it would print gibberish. The gibberish was consistent, however. It printed the same gibberish if the same file was sent to it. A closer look at the gibberish showed that Bit 2 was always set for every character printed. I opened the printer, removed its motherboard, and traced the data, strobe and busy lines back from its 36-pin connector to the first chip I encountered, which proved to be a pair of 74LS14 Hex Schmidt-trigger buffers. I replaced both buffer chips, reassembled the printer, and it prints perfectly.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services. Then at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form, which has complete instructions.

At Last! DESKTOP PUBLISHING for OS-9! Introducing...

NEWSPAPER-09!!

Finally, there's NO need to leave OS-9 to produce sophisticated-looking newsletters, signs, or documents! Create headlines & columned text, bring in different fonts, pictures, fill patterns, and text, and create publications with that PRO-look! Comes complete with fonts, pictures, and fills, ready-to-run! Req. 512k CC3, OS-9 lv 2.

Owners of Newspaper Plus may upgrade to Newspaper09 for only $25 & original disks. **$48.95**

CoCoPRO! RS-232 PAK & KIT

Created by Marty Goodman. FULLY-compatible with the Slotpak-3, Multipak, or Y-cable. Buy this re-engineered Tandy DC Modem pak complete, or purchase the kit and convert your own pak!

Pak- $44.95 Kit- $26.95

DISTO

SALE!

Super Controller II (no-halt)	**$99**
4-in-1 board	**$99**
SC2 / 4-in-1 COMBO	**$189**
One-meg upgrade	**$149**
Super Controller I (4-DOS)	**$89**
Eprom Programmer	**$45**

Adaptec 4000a hard disk board **$89**
Rare SCSI board, use with Disto.

512k Upgrade w/Lightning software **$74**
The BEST! 120ns DRAM, PP board

Slotpak-3 Multipak replacement. **$87**
12-volt adapter for above **$15**

DMA

THE DISK MANAGER'S APPRENTICE

DMA is a new file management utility set for use with the CoCo-3 under DECB. Each utility in the set has been especially created to aid in organizing disks and the files they contain. These utils are combined into a single environment called DMA. Once booted, all utils are memory-resident.

DMA features full wildcard file-handling, point-and-select filename features w/tagging, and 8 online help screens. MANY more features than any similar product. Get your disks organized quickly & easily, with DMA!

$29.95

TOOLS II

Introducing a NEW set of 27 OS-9 lv 2 tools to make your computing life easier! Features Window Utilities (such as a screen-saver, global search & replace w/wildcards, a go command to easily change directories, and more), Process Scheduling utils such as alarm & demon (a sophisticated background task mgr., w/scheduling), Script File utils such as ask and recobbler, I/O Port utils including netlink and an autodialer for voice calls (stop redialing!), and Calculation Utilities. You'll wonder how you've done without these!

All 27 utilities can be yours for only $34.95

***Data Windows*- The ultimate database package for the CoCo under OS-9! System features include user-definable fields, multiple key fields, automatic sorting, fast searching, browsing, user-definable database views, definable editing, import/export/merge, cut/copy/paste, and even report and mailing label generation! Makes full use of Multivue, but does not require it to run! Req. 512k CoCo-3, OS-9 Lv II.**

Now shipping v. 1.1. Owners of previous versions, send original disks & $4 for update **$59.95**

All Alpha Software products now available on 3½ inch 720k diskettes for only $3 more!

***Presto Partner*- all-in-one RAM-resident software, includes Note-Pad, calculator, calendar, alarm, auto-dial phonebook, clock, OS-9 command macros, and more...all running and waiting for you in the background! Req. 512k CC3, OS-9 lv 2.** **$29.95**

Data Merger	**$19.95**	**Level II Tools**	**$24.95**
Disk Mgr. Tree	**$29.95**	**The Zapper**	**$19.95**
Multi-Menu	**$19.95**	**OS9 Lv2 BBS**	**$29.95**

OS-9 Lv 2 Operating System **$34.95**

COCOPRO!

1334 BYRON YPSILANTI MI 48198

Include $4 S&H on all U.S. orders, 10% CDN. COD $4 additional. VISA/MC add 5%. No P.O. Boxes, please, as we usually ship UPS.

VISA/MC ORDERS 1.800.937.7746
ALL OTHER CALLS 1.313.481.3283
1-9 PM EST MON-SAT

For a 12-mo. subscription to our catalog of used soft- & hardware at INCREDIBLE prices (20-90% off), send $15

CoCo ConVersation

by Steven Ford

ON February 14, 1991 the Federal Communications Commission enacted an historic change in the rules that govern amateur radio. On this date, the Morse Code test requirement was dropped from the Technician Class license examination. What does this mean to you? This means it is now easier than ever to join the ranks of the amateur radio service!

License to Communicate

The new Technician license offers communications privileges on a vast range of frequencies that begin at 50 MHz. These groups (or bands) of frequencies are commonly known as VHF, UHF and microwave.

For Color Computer enthusiasts, the Technician license opens the door to the fascinating world of packet radio. Packet radio is basically a form of computer networking that uses radio signals rather than wires. The Color Computer's excellent flexibility makes it an ideal candidate for use as a packet-radio terminal. With a simple terminal program, a terminal node controller (or TNC) and a VHF transceiver, your CoCo can instantly communicate with other computers throughout your local area.

Amateur radio packet bulletin boards (similar to a telephone BBS) operate in most areas of the United States, Canada and elsewhere. These bulletin boards serve as clearing houses for messages concerning a wide variety of topics. Not only can you communicate with your neighbors, you can also send messages to individuals thousands of miles away. For example, I recently read a packet message from a ham radio operator in the Soviet Union. He was searching for a part for an old radio and sent a general request message to all packet bulletin boards!

If you would like to set up your own CoCo bulletin board system, there is software on the market that will permit you to do so. And if you don't care to hobnob with the gang on the VHF network, you may establish a dedicated UHF or microwave link to your friends across town. Imagine having your own semiprivate computer network — without telephone lines! Do you want to swap a program or a file? No problem, just tap out the proper instructions and your CoCo will take it from there. I know someone who established a 1.2 GHz microwave link to a friend who lives about 20 miles away. They constantly send image files and random comments back and forth whenever the spirit moves them.

You can also use your new license (and your CoCo) to communicate with amateur radio satellites in orbit. Software is available that allows your CoCo to track the positions of satellites, so you will know when a particular "bird" is in range for communication. For more information on satellite-tracking software for the Color Computer, send an SASE to AMSAT, P.O. Box 27, Washington, DC 20044.

Don't forget, with the Technician license you can also talk! In fact, you can talk quite a bit. While the average range of direct communication on VHF, UHF and microwave is somewhat limited, there are major exceptions to the rule. The 50- to 54-MHz band (known as 6 meters) has excellent long-range potential. When conditions are favorable, contacts spanning several thousand miles are not uncommon.

For local conversation, it's hard to beat the 144- and 220-MHz bands. There are few ham operators who don't have a VHF/FM transceiver mounted under the dashboard or hanging from their belt. Through the use of special relaying devices known as repeaters, the range of VHF/FM communications can be extended over many miles. I can't count how many times my own little

Steven Ford is an amateur radio operator licensed to the Advanced class. He has a bachelor's degree in English and an associate's degree in electronic engineering. He can be contacted at 9 Grieb Court, Wallingford, CT 06492. Please include an SASE when requesting a reply.

transceiver has rescued me from being lost in a strange city. Unlike CB, communication on VHF/FM transceivers is crisp, clear and reliable.

Perhaps you and a group of friends could establish a schedule to meet on a certain frequency, day and time to discuss CoCo computing. This type of schedule is known as a net in the amateur radio service. If you have access to a shortwave receiver and you'd like to hear what a net sounds like, switch to the SSB mode and tune to 14.259 MHz on Sunday afternoons at 4 p.m. EDST (that's 2000 UTC/GMT). With any luck you may hear the Color Computer Net that meets on that frequency. Listen for the callsign of the net control station, KB8BMN.

Why limit yourself to speech? How would you like to set up your own television transmitting and receiving station? On amateur radio it's called ATV and it is becoming very popular on the 440-MHz UHF band. The outstanding graphics capabilities of your Color Computer can be put to good use in this branch of the hobby.

The New Technician Examination

Actually, the Technician license itself is not new. New is the fact that you no longer have to take a five word-per-minute Morse Code test. Now, your only requirement is a passing grade (75 percent) on a written examination. The exam covers basic and intermediate electrical theory, operating practices and FCC law. But don't let this scare you away! The test is not nearly as difficult as it sounds. I know a nine-year-old who recently passed the test with flying colors.

I highly recommend the following study guides: *Now You're Talking!* and *The FCC Rule Book*. Both of these guides can be purchased from the American Radio Relay League, 225 Main Street, Newington, CT 06111 (203-666-1541).

Now You're Talking! provides everything you'll need to know to pass the examination. This guide takes you step-by-step through the theory and provides examples and illustrations that make it simple to learn. *The FCC Rule Book* explains federal regulations in easy-to-understand language. By carefully studying both books, you'll be fully prepared to take — and pass — the test.

The Technician Class test is given by a volunteer examiner. In many instances, local ham radio clubs offer examination sessions and study classes. Write or call the American Radio Relay League's Educational Activities Department (department CO). They can send you a list of all available study guides and provide the location of your nearest club or examiner.

Note: As of this date the ARRL is dealing with a tidal wave of requests for information about the new Technician license. If you write, expect a slight delay before you receive your information.

No Excuse

If you've been putting off getting your ham operator's license because you thought you couldn't master Morse Code, you now have no excuse. And if you can study the Morse Code language, you'll open the door to the higher grade Technician license that offers communication capabilities on the long-range, shortwave frequencies. Study a little harder and you can snare the General, Advanced or even Extra class licenses. Your operating privileges will grow as you rise higher in the ranks.

No matter which license you hold, your CoCo can become an important partner in your enjoyment of this fascinating hobby. The CoCo and amateur radio are truly made for each other. Why not give it a try?

SYSTEM IV

THE BEST OF THREE WORLDS

1 - A Multi-User Multi-Tasking System
2 - Optional Plug-in Board for MS-DOS
3 - Optional Emulator/Interpreter for OS-9/6809 Software

SYSTEM IV - The 68000 Computer *already* serving customers here and abroad!

- Expandable using readily available low-cost cards
- Flexible enough to tailor to your requirements
- Versatile enough to use OS-9/68000, OS-9/6809 and MS-DOS applications
- Powerful - outperforms other machines in its' price class

Just call, FAX, or drop us a line. We will respond promptly with complete pricing and specifications.

DELMAR CO - the Company that's been serving its' customers since 1975.

Terminal Systems ..... from $ 999.00
Console Systems ..... from $1,149.00

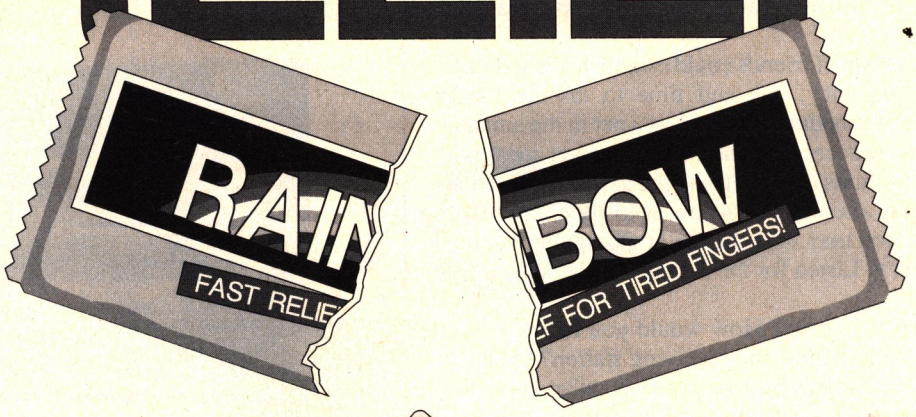
Assembled boards and kits available

RAINBOW CERTIFICATION SEAL

delmar co

Middletown Shopping Center - PO Box 78 - Middletown, DE 19709
302-378-2555 FAX 302-378-2556

RELIEF

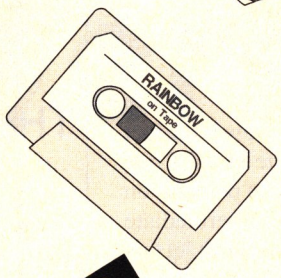


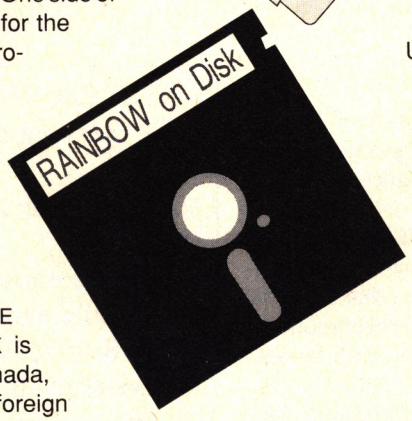
Subscribe to these convenient services and receive each month's programs in a ready-to-run form. No more long tedious hours wasted typing! No more red eyes and sore fingers! All you do is load and run, using the current issue of THE RAINBOW as documentation.

OS-9 programs are available too! One side of the RAINBOW ON DISK is formatted for the OS-9 operating system (OS-9 programs cannot be put on tape) so you can get all the great programs in the magazine.

A one-year subscription to THE RAINBOW and RAINBOW ON TAPE is only $91 in the U.S., $108 in Canada, $153 foreign surface rate and $188 foreign airmail.

A one-year subscription to THE RAINBOW and RAINBOW ON DISK is only $115 in the U.S., $138 in Canada, $183 foreign surface rate and $218 foreign airmail. U.S. currency only.





Back issues of both RAINBOW ON TAPE and RAINBOW ON DISK are also available! (see our back issue ad in this issue)

RAINBOW ON TAPE back issues are available beginning with the April 1982 issue. A single copy of RAINBOW ON TAPE is $10 within the U.S., $12 in all other countries. The annual subscription for RAINBOW ON TAPE is $80 within the U.S.;$90 in Canada; and $105 for all other countries. U.S. currency only.

RAINBOW ON DISK back issues are available beginning with the October 1986 issue. A single copy of RAINBOW ON DISK is $12 within the U.S., $14 in Canada, $16 in all other countries.The annual subscription for RAINBOW ON DISK is $99 within the U.S.;$115 in Canada; and $130 for all other countries.U.S. currency only please.

Subscribe today and start enjoying THE RAINBOW and your CoCo the easy way, without the fuss!

and Save Money Too!

Yes! Sign me up for a joint 1-year subscription (12 issues) to:

❑ THE RAINBOW and Rainbow on Tape ❑ THE RAINBOW and Rainbow on Disk

❑ New ❑ Renewal (attach labels)

Name _____

Address _____

City _____

State _____ Zip _____

❑ My check in the amount of _____ is enclosed.

charge to: ❑ VISA ❑ MasterCard ❑ American Express

Account Number _____

Expiration Date ____ Signature _____

Use our convenient subscription envelope inserted in this magazine. For credit card orders call(800) 847-0309, 9a.m. to 5 p.m. EST. All other inquiries call (502) 228-4492

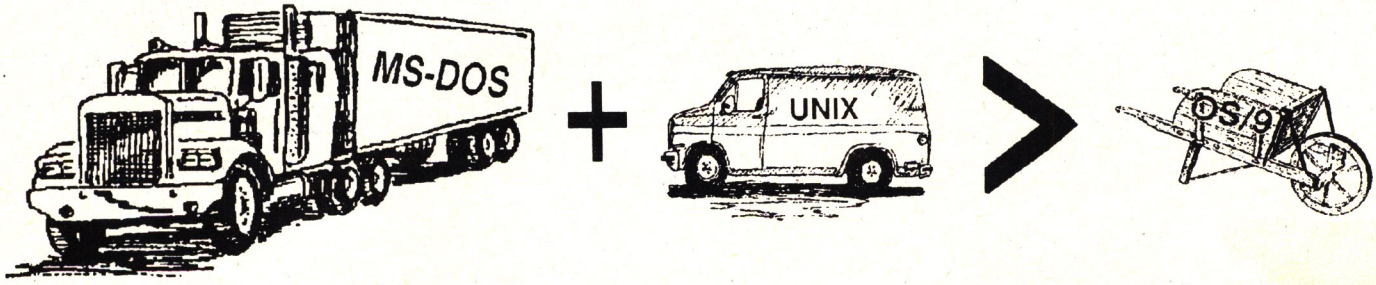
*** Payment must accompany order, we do not bill. U.S. currency only, please. Kentucky residents add 6% sales tax; Canadian residents , 7% GST. Please allow 6 to 8 weeks for delivery of first copies. All subscriptions begin with the current issue.**

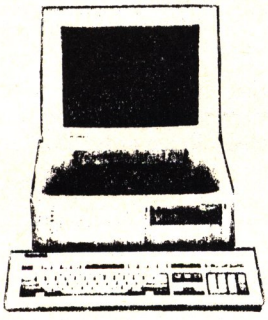
Please note : While group purchases of RIANBOW ON TAPE and RAINBOW ON DISK are permitted (and multiple subscriptions are even discounted, if purchased in one order from a club), no license to make copies is conveyed or implied. Unauthorized coping of any copyright product is strictly illegal.

Would You Buy a Car You Couldn't Get Fuel For?

Why Buy a Computer You Can't Get Software For?

Many of you are now considering an alternative to the Color Computer to run OS/9. Are you really going to invest in an untried alternative with very limited software? Why not buy a computer that will run a UNIX Compatible (OS/9 like) operating system AND MS-DOS. According to published articles, this combination of industry-standard operating systems would run more than 90% of ALL of the software that has EVER been written. Compare the software bases represented below. We call these systems the OWL ATom.™ Can your alternative to the CoCo be fixed locally? On-site service is available most areas on the ATom.





OWL ATom™ ET or SX

These highly adaptable computers we call the **OWL ATom™** series. They are not newcomers to the computer world, but are the current versions of computers which we have been building for more than 6 years. All systems can be configured with your choice of hard drive, graphics monitor, and 6 different processors. The systems described here are typical of the new versions of our line which offer 2 industry-standard operating systems.

For general features of our OWL ATom including expansion capabilities, check out the table below. Comparisons are also given to several Tandy™ computers. The resolution of the optional VGA is also given.

Typical system components:
Processor: 80286-12 or 80386SX-16
Floppy drive: 1.2 or 1.44 Meg
Memory: 1MB
Hard Drive: 40 MB, 28 ms.
Monitor: TTL Monochrome (720X350)

MS-DOS Software:
MS-DOS (with all utilities)
GWBASIC
Integrated Software including:
Desktop Organizer with tracker
Outliner
Word Processor
Spelling Checker
Spreadsheet
Data Base
Graphics program
Communications

UNIX Compatible Software:
Coherent™ (A UNIX Compatible Operating System)
C Compilier
Full Screen Editor
Line Editor
Text Formattor
AWK Language and Yacc
Standard UNIX utilities

Documentation:
Over 1500 pages and VHS Tape

One of the best features is the price:

$1295/$1495

First year on-site service $45 (Most areas)
VGA Color (800X600X256 colors) $400.
Call 215-837-1917 for other options

FEATURES	OWL ATom	2500 XL*	1000 TL/2*
Processor (Speed)	80286(12)	80286(10)	80286(8)
Total Slots	8	3	4
16 Bit Slots	6	3	0
Standard Memory	1024K	1024K	640K
Max. on Board RAM	4096K	1024K	768K
Graphics Output	VGA	VGA	CGA
Max. Resolution	1024X768	640X480	640X200
Drive Slots	5	3	3
Hard Drive Interface	Yes(16 Bit)	Yes(16 Bit)	Yes(8 Bit)
Floppy Drive	1.2 or 1.44 Meg	1.44 Meg	720K
Power Supply (Watts)	200	70	67
Warranty (Parts and Labor)	1 Year	1 Year	1 Year

* Trademarks as follows: Model numbers -Tandy Corporation, MS-DOS- Microsoft, Inc., OS/9 -MicroWare, Inc., UNIX- AT&T, Inc.

OWL-WARE
P.O. Box 116
Mertztown, PA 19539
Call to Order: (800)245-6228
PA and Support: (215)837-1917

Proven

On the Razor's Edge of

The New Frontier:

The Most Advanced Color Computer Drive Systems Ever Offered!

Fast No-Halt SCSI Floppies Using Optional SCSI Controller

Proven Performance for Demanding Home or Business Users

This is the most advanced, fully assembeled CoCo hard drive system offered. **Using the optional OMTI 5200 SCSI controller with our Hard Drive Interface, our new system will support no-halt floppy drives.** You need not wait while typing or worry about clock time losses. Why be limited to 3 floppy drives? A complete system could now consist of 1-3 standard CoCo floppy drives, 1-2 (or more) hard drives, and 1-3 no-halt floppies using standard (not just CoCo) OS/9 format. You can use single or double-sided 40 or 80 track drives with the SCSI no-halt controller.

There are several new features with this improved interface. These include:

- **Full SASI/SCSI compatible (this allows many add-ons to the versatile SCSI buss)**
- **No-Halt Floppies with optional SCSI controller allows full type-ahead during access**
- **Low factory-direct prices**
- **Fast Delivery from factory stock**
- **Optional Real Time Clock with built in battery (3-10 year lifetime)**
- **With the Clock you have 240 Bytes of battery backed up RAM for password protection or data storage!**
- **Same super stable LRTech quality**

Interface Price only: $85.

Real Time Clock-RAM: $25.

20 or 30 Meg. 40 Meg. 80 Meg.

System Prices: (Includes Hard Drive, case, & fan, SCSI Controller*, LR/OWL Interface, Software. Fully assembled and tested.)

$495. $535. $875.

Super System Prices: (LR/OWL System as above but OMTI 5200 SCSI Controller AND 3.5" or 5.5" HD 80 Track Floppy in same case)

$595. $645. $1039. (2 cases)

*SCSI controller is OMTI 5100. Add $75 for OMTI 5200 with FDC.

Introducing the *Quick-Link*™ Interface

Provides both a 64K Printer Buffer and Serial and Parallel Interfaces.

Serial to Parallel Printer Interface (64K Buffer) $65.

Converts serial computer output to parallel printer and also provides a 64K buffer in front of the printer. Serial side Female DB-25 and Parallel side is Centronics. Includes Centronics to Centronics cable and power AC-adapter. If you need an adapter from the CoCo 4-pin serial to DB-25 add $9. From 300-38,400 Baud.

Parallel to Serial Interface (64K Buffer) $45.

Same as above except it converts Centronics parallel computer output to DB-25 Female serial. Plug into an IBM printer cable to provide output to a serial plotter.

Parallel to Parallel (64K Buffer) $39.

This is parallel printer buffer with no conversion.

Drive System Parts

Hard Drives

20/30 Meg	ST/PTI	$229.
40 Meg	PTI	265.
80 Meg	ST4096	590.

SCSI Controllers

OMTI 5100	HD Only	$79.
OMTI 5200	HD/FD	169.
OMTI 5400	HD/FD/Tape	199.

(Note: We have no drivers for tape yet)

Cases and Cables

Case, 45 Watt PS, Fan	$105.
Cable set (3 pieces)	25.

Drives have a 1-year limited warranty. Other parts are 90-day warranty. Please Note - At these prices, only very limited support can be given.

Technology

the Color Computer Frontier

OWL Phones
Order Numbers (only)
1-800-245-6228
1-215-682-6855
Fax: 1-215-837-1942
Technical Help
1-215-837-1917

DISK DRIVES

Floppy Drive Systems

The Highest Quality for Years of Service

Drive 0 Systems (Half Height, Double Sided, Direct Drives) **$189.**

Drive 0 systems complete with drive, controller, legal DOS, cable, case, power supply, and manual

Drive 1 Systems (Half Height, Double Sided, Direct Drives) **$115.**

New 3.5", 720K Drives for OS-9 with case & Power Supply **$149.**

Drive 1 Systems have drive, case, power supply. (You may require optional cable and/or DOS chip to use)

Special for 0/1 Combos (0,1,2,3) $259.

SALE Prices on Drives!

HALF- HEIGHT DRIVE UPGRADES FOR RS HORIZONTAL CASES

Why only double the capacity of your system when you can triple in the same case? Kit includes: double-sided to fit your case, chip to run both sides of new drive, hardware, and detailed instructions. Easy! Takes only 5 minutes!

Model 500 , 501, or 502 Only $119.

All drives are new and fully assembled. We ship only FULLY TESTED and CERTIFIED at these low prices. We use Fuji, YE Data, and other fine brands. No drives are used or surplus unless otherwise stated to you when you order. We appear to be the one of the few advertisers in Rainbow who can truly make this claim. We have 7 years experience in the CoCo disk drive market! We are able to provide support when you have a problem.

Drives 1 Year Warranty

OWL WARE Software Bundle

Disk Tutorial/Utilities/Games

DISK TUTOR Ver 1.1

Learn how to use your disk drive from this multi-lesson, machine language program. This tutor takes you through your lessons and corrects your mistakes for a quick, painless disk drive introduction. (This professionally written tutor is easily worth the bundle's total price.)

3 UTILITIES

A copy verify, copy, and DOS utility.

2 GAMES

We will select 2 games from our stock. These are sold for more than $20 each.

Do not mistake this software with cheap "Public Domain" software which others offer. All of this software is copyrighted and professional in quality. The tutor is unique with us and has helped thousands of new users learn their disk drive.

only $27.95
(or even better)
only $6.95 with
any Disk Drive Purchase!!

512K Upgrade

Again at a popular price. Fully assembled and tested before shipping. Easy to install. Uses fast 120 ns. chips.

Only $85.

Now includes **memory test, Ram Disk Lighting, Printer Lighting, and Back-up Lighting.** All with an upgraded manual exclusive with OWL!

Our prices include a discount for cash but do not include shipping.

OWL-WARE has a liberal warranty policy. During the warranty period, all defective items will be repaired or replaced at our option at no cost to the buyer except for shipping costs. Call our tech number for return. Return of non-defective or unauthorized returns are subject to a service charge.

OWL-WARE
P.O. BOX 116
Mertztown, PA 19539

The Assembly Line
The ML Mailbag

by William P. Nee

Many people have written to ask me questions — both general and specific questions — about machine-language programming. In this article I will share some of these questions, my answers and a bonus program.

What books about machine-language programming would you recommend?

I have only two books about machine-language programming. These two books are *6809 Assembly Language Programming* by Lance A. Leventhal (Osborne/McGraw-Hill) and *TRS-80 Color Computer Assembly Language Programming* by William Barden, Jr. (Radio Shack Catalog 62-2077). The Leventhal book is generic and covers general assembly-language techniques, whereas the Barden book is specifically for the CoCo and includes several examples and programs. Unfortunately, the latter book is out of print. Still, any William Barden essay is an excellent tutorial. If you find a copy, guard it well.

How did you learn the locations and functions of all the ROM subroutines?

I kept a notebook of all routine locations mentioned in articles and programs, along with a brief description of their functions. Later, when I got an *EDTASM+* cartridge, I broke down the routines and followed along with them. A lot of this was trial-and-error programming resulting in many "crashes." But experimentation can't hurt the CoCo. Also, review back issues of THE RAINBOW for information you may have missed.

Do you prefer the cartridge or Disk EDTASM?

They both have their advantages, but I prefer the cartridge. With the cartridge, I can run programs without removing it, and I can debug as I go along. For longer programs, I usually test routines with the cartridge and then assemble everything on disk.

Why do I keep getting the error message "Byte Overflow"?

This message usually means you are trying to use the regular branch instructions to move to a location more than 127 bytes away. When you get this error, put an L in front of the branch command (LBEQ, LBRA, etc.). If you add several long branches, you increase the program's length, so debug it again in case you have to add any more.

How do macros work?

A macro is just a specialized routine. You can write as many macros as you want, save them in one macro file and call or *include* them in any machine-language program. I generally put macros at the beginning of a program rather than using INCLUDE so the disk doesn't come on every time the macro is called. Values can be passed to a macro, which makes for efficient-looking programs. A sample program with a macro is shown in Figure 1 (see Page 30). This program performs a logical shift right (LSR) of Register D 13 times. More than one value can be passed to a macro, as can memory locations. (Next month we'll cover macros in more detail.)

Why can't the following be used to employ Register U as a counter?

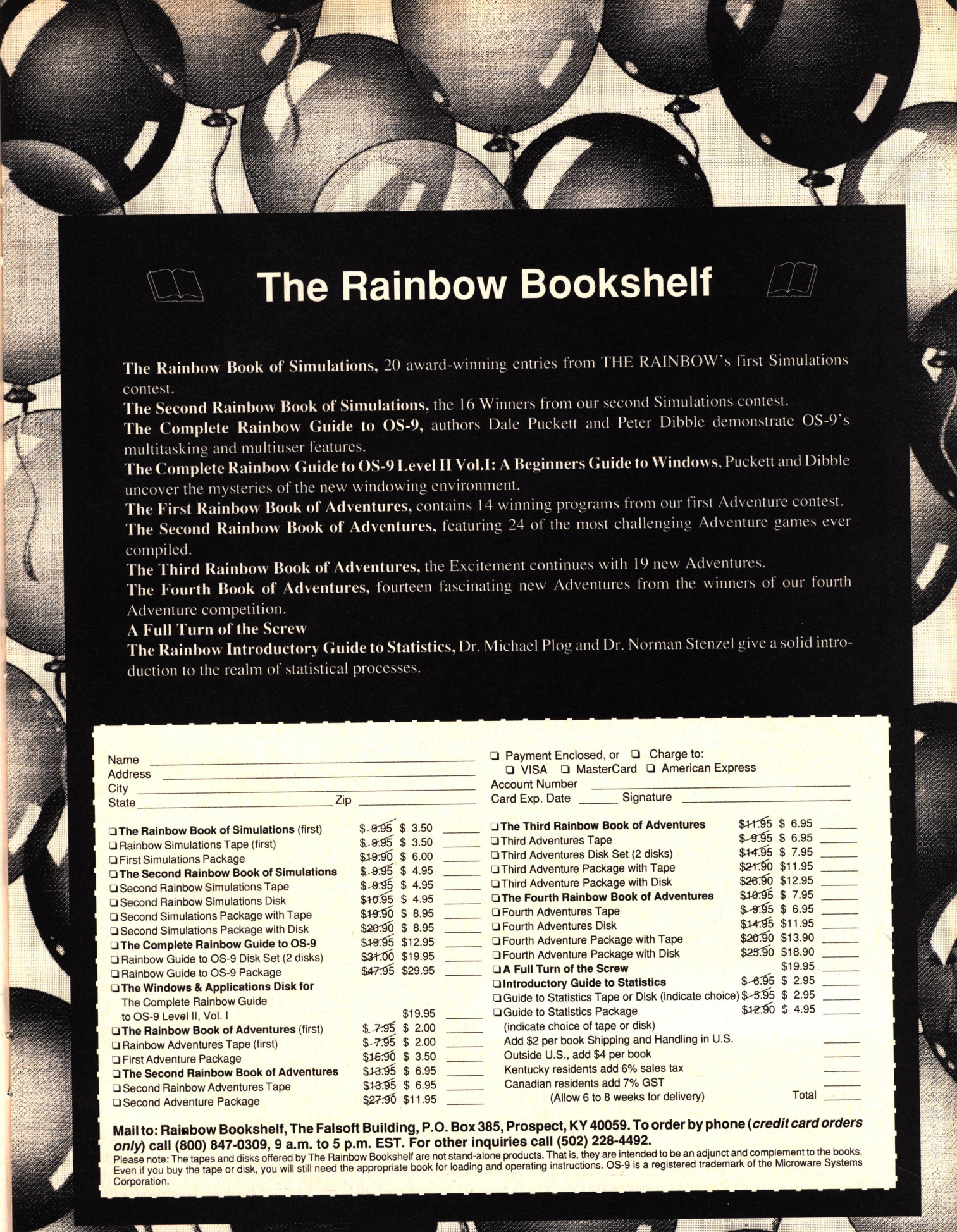
```
      LDU   #200
L1    .
      .
      .
      LEAU  -1,U
      BNE   L1
```

The problem is that LEAU and LEAS do not affect the Zero flag, so the program does not know when it has reached zero. However, the LEAX and LEAY instructions do affect the Zero flag.

What is the best way to debug a machine-language program?

First, check for syntax errors and illegal procedures with A/NO/NS/WE. When this results in 00000 errors, your program is technically correct, at least as far as *EDTASM* is concerned. Next, look for errors in the program branches, especially if the pro-

Bill Nee reversed the snowbird trend by retiring to Wisconsin from a banking career in Florida. He spends the long, cold winters writing programs for his CoCo. He can be contacted at Rt. 2, Box 216C, Mason, WI 54856-9302. Please include an SASE when requesting a reply.



The Rainbow Bookshelf

The Rainbow Book of Simulations, 20 award-winning entries from THE RAINBOW's first Simulations contest.

The Second Rainbow Book of Simulations, the 16 Winners from our second Simulations contest.

The Complete Rainbow Guide to OS-9, authors Dale Puckett and Peter Dibble demonstrate OS-9's multitasking and multiuser features.

The Complete Rainbow Guide to OS-9 Level II Vol.I: A Beginners Guide to Windows. Puckett and Dibble uncover the mysteries of the new windowing environment.

The First Rainbow Book of Adventures, contains 14 winning programs from our first Adventure contest.

The Second Rainbow Book of Adventures, featuring 24 of the most challenging Adventure games ever compiled.

The Third Rainbow Book of Adventures, the Excitement continues with 19 new Adventures.

The Fourth Book of Adventures, fourteen fascinating new Adventures from the winners of our fourth Adventure competition.

A Full Turn of the Screw

The Rainbow Introductory Guide to Statistics, Dr. Michael Plog and Dr. Norman Stenzel give a solid introduction to the realm of statistical processes.

Name _____
Address _____
City _____
State _____ Zip _____

❑ Payment Enclosed, or ❑ Charge to:
❑ VISA ❑ MasterCard ❑ American Express
Account Number _____
Card Exp. Date _____ Signature _____

❑ **The Rainbow Book of Simulations** (first)	~~$ 9.95~~	$ 3.50	_____
❑ Rainbow Simulations Tape (first)	~~$ 9.95~~	$ 3.50	_____
❑ First Simulations Package	~~$19.90~~	$ 6.00	_____
❑ **The Second Rainbow Book of Simulations**	~~$ 9.95~~	$ 4.95	_____
❑ Second Rainbow Simulations Tape	~~$ 9.95~~	$ 4.95	_____
❑ Second Rainbow Simulations Disk	~~$10.95~~	$ 4.95	_____
❑ Second Simulations Package with Tape	~~$19.90~~	$ 8.95	_____
❑ Second Simulations Package with Disk	~~$20.90~~	$ 8.95	_____
❑ **The Complete Rainbow Guide to OS-9**	~~$19.95~~	$12.95	_____
❑ Rainbow Guide to OS-9 Disk Set (2 disks)	~~$31.00~~	$19.95	_____
❑ Rainbow Guide to OS-9 Package	~~$47.95~~	$29.95	_____
❑ **The Windows & Applications Disk for** The Complete Rainbow Guide to OS-9 Level II, Vol. I		$19.95	_____
❑ **The Rainbow Book of Adventures** (first)	~~$ 7.95~~	$ 2.00	_____
❑ Rainbow Adventures Tape (first)	~~$ 7.95~~	$ 2.00	_____
❑ First Adventure Package	~~$15.90~~	$ 3.50	_____
❑ **The Second Rainbow Book of Adventures**	~~$13.95~~	$ 6.95	_____
❑ Second Rainbow Adventures Tape	~~$13.95~~	$ 6.95	_____
❑ Second Adventure Package	~~$27.90~~	$11.95	_____

❑ **The Third Rainbow Book of Adventures**	~~$11.95~~	$ 6.95	_____
❑ Third Adventures Tape	~~$ 9.95~~	$ 6.95	_____
❑ Third Adventures Disk Set (2 disks)	~~$14.95~~	$ 7.95	_____
❑ Third Adventure Package with Tape	~~$21.90~~	$11.95	_____
❑ Third Adventure Package with Disk	~~$26.90~~	$12.95	_____
❑ **The Fourth Rainbow Book of Adventures**	~~$10.95~~	$ 7.95	_____
❑ Fourth Adventures Tape	~~$ 9.95~~	$ 6.95	_____
❑ Fourth Adventures Disk	~~$14.95~~	$11.95	_____
❑ Fourth Adventure Package with Tape	~~$20.90~~	$13.90	_____
❑ Fourth Adventure Package with Disk	~~$25.90~~	$18.90	_____
❑ **A Full Turn of the Screw**		$19.95	_____
❑ **Introductory Guide to Statistics**	~~$ 6.95~~	$ 2.95	_____
❑ Guide to Statistics Tape or Disk (indicate choice)	~~$ 5.95~~	$ 2.95	_____
❑ Guide to Statistics Package (indicate choice of tape or disk)	~~$12.90~~	$ 4.95	_____
Add $2 per book Shipping and Handling in U.S.			_____
Outside U.S., add $4 per book			_____
Kentucky residents add 6% sales tax			_____
Canadian residents add 7% GST			_____
(Allow 6 to 8 weeks for delivery)		Total	_____

Mail to: Rainbow Bookshelf, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. To order by phone (*credit card orders only*) call (800) 847-0309, 9 a.m. to 5 p.m. EST. For other inquiries call (502) 228-4492.

Please note: The tapes and disks offered by The Rainbow Bookshelf are not stand-alone products. That is, they are intended to be an adjunct and complement to the books. Even if you buy the tape or disk, you will still need the appropriate book for loading and operating instructions. OS-9 is a registered trademark of the Microware Systems Corporation.

```
LSRD  MACRO        'your title followed by "MACRO"
      LDX   \0     'load Reg X with first value passed
\.A   LSRA         'shift Reg D to the right
      RORB
      LEAX  -1,X
      BNE   \.A    'loop if Reg X isn't 0
      ENDM         'end of the macro
      ORG   $6000  'actual m/l program
START LDD   #$FFFF
      LSRD  #13    'call the macro with a value of 13
      SWI
      END   START
```

Figure 1: Sample Macro

gram runs for a while and then tries to demonstrate the "big bang" theory. If you have values greater than 127, be sure you use unsigned branches. And if your program allows negative numbers, be sure to use signed branches. If you still have problems, step through the program one line at a time by using START and then repeatedly pressing the comma (,) key. You can put dummy values in variables and registers to test them. Use R to check the values of all the registers.

Why do I keep getting a "Bad Memory" error message? How do I assemble and save programs with the disk EDTASM?

The Bad Memory message means you are trying to put the program into memory where it will eat up some of the space *EDTASM* has reserved to store source code, which would ruin your program. If you must put the program in memory, use A/IM with an ORG of $0000. The program is now in the first available location after your stored source code. This is usually unnecessary unless you're trying parts of your program while debugging it. I usually run all machine-language programs with a short BASIC program as follows:

```
0 CLEAR 200,&H6000-1 (start address - 1)
1 EXEC &H6015 (execution address)
```

Always remove all disks before trying a new program. I've accidentally reformatted more than my share of work disks by not doing this.

Why can't I use the following method to get the 200th value from location ARRAY?

```
LDY  #ARRAY
LDA  #200
LDB  A,Y
```

This method does not work because *EDTASM* considers all accumulator offsets to be signed numbers, from -128 to +127. For the above example to work you could use the following:

```
LDY  #ARRAY
LDD  #200
LDA  D,Y
```

There is also another way to do the above using just Registers X and B. Do you have any ideas?

A Bonus Program

Any study of statistics and probability usually includes a binomial curve or probability curve — the same binomial coefficients you studied in math class, as shown in Figure 2. Each number between the ones is the sum of the two numbers just above it. They also represent the probability of a single event occurring out of the total number ($^1/_8$, $^3/_8$, $^3/_8$, $^1/_8$). This curve can be demonstrated using the Japanese game of Puchinko — a real craze in the 1960s. Puchinko is sort of like an upright pinball without the paddles and bumpers. A ball starts at the top, hits a peg, falls one space right or left, hits another peg, falls right or left, etc. As balls fall, they eventually land on top of each other. At the end, the resulting curve the balls make is a probability curve.

This can be demonstrated by letting one ball fall all the way down, then starting the next one and continuing this pattern. But I want several falling at one time. Listing 1 shows how this is done in BASIC. The balls drop a certain distance and move right or left as they fall, then fall straight down on top of each other. The distance in Line 140 and Line 250 is how far they fall initially. All of the balls start with a status of 0; Status 1 means the ball is falling and moving right or left; Status 2 indicates the ball is now falling straight down; and Status 3 means the ball has landed and won't move again. Line 60 is how far the ball falls before coming to rest (unless it lands on another ball). The number of balls is in Line 20.

The machine-language program in Listing 3 follows the BASIC program right down the line. Initially, I used the random number generator at $BF1F in the CoCo's ROM, but it was too slow. Using this routine caused a visible ripple going up the screen as the balls moved. To correct this problem, I devised a pseudo-random number generator. Any time the RANDOM command is used, new *seed* values are placed in Locations $0116 and $0118. These values are combined with the contents of $BF74 and $BF76, run through the Floating Point Accumulator and produce a result similar to RND(0). I eliminated several steps for a much shorter and quicker method (lines 520-660).

Just to be sure, I inserted a RANDOM(0) call, JSR $BF3B (Line 820 and Line 1380) at the end of each SS loop. This changes the values in $0116 and $0118, but doesn't slow things down too much. You could eliminate these two lines and see if the display still looks random enough. The distance a ball can fall (120) on a random basis is a variable (Line 700 and Line 1260) and could be poked into memory by the BASIC program. Notice that I made extensive use of Extended Indirect Addressing, which is indicated by the values with brackets around them. The arrays hold only 1535 values, so don't use any more balls.

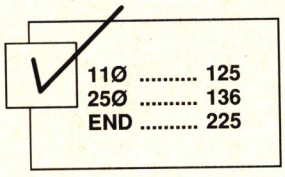
```
    1          (Total = 1)
   1 1         (Total = 2)
  1 2 1        (Total = 4)
 1 3 3 1       (Total = 8)
etc.
```

Figure 2: Binomial Coefficients

When you've debugged the program with A/NO/NS/WE, save the source code with W PUCHINKO.SRC and assemble it with A PUCHINKO.BIN /NS/WE. Listing 2 is a BASIC driver for the machine-language program. The number of balls is read in Line 110. If you don't want the balls to drop all the way, change the Y distance in Line 80. Save this program as PUCHINK2. It automatically loads the machine-language program, if necessary.

Next Time

In my next article I'll discuss macros, fractals and recursion (hmm, that sounds like a law firm). If you have any questions about machine-language programming, or if you have ideas for future articles, please let me know. ❑



Listing 1: PUCHINK1

```
1 'THE ASSEMBLY LINE
2 'WRITTEN BY WILLIAM NEE
3 'COPYRIGHT (C) JULY 1991
4 'BY FALSOFT, INC.
5 'RAINBOW MAGAZINE
10 CLEAR100,&H7FFF
20 L=1400
30 DIM S(L),X(L),Y(L)
40 X=RND(-TIMER)
50 PMODE4,1:PCLS:SCREEN1,1
60 LINE(0,191)-(255,191),PSET
70 FOR N=0 TO L:S(N)=0
80 FOR S=0 TO N
90 IF S(S)=2 THEN 300
100 IF S(S)=3 THEN 170
110 IF S(S)=0 THEN X(S)=127:Y(S)
=0:S(S)=1:PSET(X(S),Y(S)):GOTO17
0
120 Y(S)=Y(S)+1
130 DX=2*RND(2)-3
140 PRESET(X(S),Y(S)-1):IF Y(S)>
120 THEN S(S)=2
150 X(S)=X(S)+DX
160 PSET(X(S),Y(S))
170 NEXT S
180 NEXT N
190 T=0:FOR S=0 TO L
200 IF S(S)=3 THEN 280
210 T=1
220 IF S(S)=2 THEN 400
230 Y(S)=Y(S)+1
240 DX=2*RND(2)-3
250 PRESET(X(S),Y(S)-1):IF Y(S)>
120 THEN S(S)=2
260 X(S)=X(S)+DX
270 PSET(X(S),Y(S))
280 NEXT:IF T<>0 THEN 190
290 GOTO 290
300 IF PPOINT(X(S),Y(S)+1)<>0 TH
EN S(S)=3:GOTO 170
310 PRESET(X(S),Y(S))
320 Y(S)=Y(S)+1
330 PSET(X(S),Y(S))
340 GOTO 170
400 IF PPOINT(X(S),Y(S)+1)<>0 TH
EN S(S)=3:GOTO 280
410 PRESET(X(S),Y(S))
420 Y(S)=Y(S)+1
430 PSET(X(S),Y(S))
440 GOTO 280
```

Listing 2: PUCHINK2

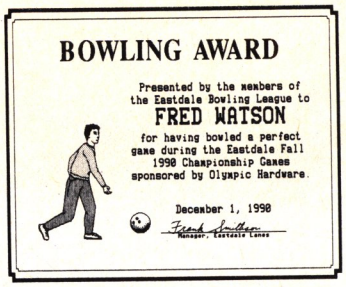
```
1 'THE ASSEMBLY LINE
2 'WRITTEN BY WILLIAM NEE
3 'COPYRIGHT (C) JULY 1991
4 'BY FALSOFT, INC.
5 'RAINBOW MAGAZINE
10 CLEAR200,&H6000
20 IF PEEK(&H600E)<>134 THEN LOA
DM"PUCHINKO":POKE &HFF40,0
30 READ NU
40 MS=INT(NU/256):POKE&H6000,MS
50 LS=NU-MS*256:POKE&H6001,LS
60 X=RND(-TIMER)
70 PMODE4,1:PCLS:SCREEN1,1
80 LINE(0,191)-(255,191),PSET
90 EXEC &H600E
100 GOTO 100
110 DATA 1000
```

Listing 3: PUCHINKO.ASM

```
00100          ORG     $6000
00110 NUMBER   RMB     2
00120 NN       RMB     2
00130 SS       RMB     2
00140 DX       RMB     1
00150 SAME     RMB     1
00160 NEWS     RMB     2
00170 NEWX     RMB     2
00180 NEWY     RMB     2
00190
00200 START    LDA     #$FF
00210          STA     $B5
00220          LDD     #0       OUTER LOOP
00230 L1       STD     NN
00240          LDX     #STATUS
00250          CLR     D,X      CLEAR STATUS ARRAY
00260          LDD     #0       INNER LOOP
00270 L2       STD     SS
00280          LDU     #STATUS
00290          LDX     #XCORD
00300          LDY     #YCORD
00310          LEAU    D,U
00320          STU     NEWS     CURRENT STATUS LOCATION
00330          LEAX    D,X
00340          STX     NEWX     CURRENT XCORD LOCATION
00350          LEAY    D,Y
00360          STY     NEWY     CURRENT YCORD LOCATION
00370          LDB     [NEWS]   GET CURRENT STATUS
00380          CMPB    #3
```


Awards, Certificates, Licenses, and Diplomas

First Prize™ features an extensive collection of templates with superbly crafted art and titles. After selecting a template, you choose a border, fill in the date and signature lines, and type in whatever you want to say in the main text area. Many titles can also be edited.


BOWLING AWARD
Presented by the members of the Eastdale Bowling League to
FRED WATSON
for having bowled a perfect game during the Eastdale Fall 1990 Championship Games sponsored by Olympic Hardware.
December 1, 1990

First Prize Includes Nine Template Disks, Program Disk, Labeled Disk-Storage Box, 32 Page User's Manual, and 64 Page Template Directory. Price $49.95

Program requires a mouse or joystick, 64K CoCo II or 3, disk drive and compatible printer. Printer support is mostly similar to our Label Designer, but please specify your printer(s) when ordering.

Ordering Instructions: All orders add $3.00 Shipping & Handling. UPS COD (cash only) add $4.00 more. VISA/MC Accepted. PA residents add sales tax.

Zebra Systems, Inc., 121 S. Burrowes Street, State College, PA 16801 (814) 237-2652

```
00390          BEQ     LOOP1   DON'T MOVE IT
00400          CMPB    #2
00410          LBEQ    CH1
00420          CMPB    #0
00430          BNE     L3
00440          LDA     #$80
00450          STA     [NEWX]
00460          CLR     [NEWY]
00470          LBSR    PSET    PSET(128,0)
00480          LDB     #1
00490          STB     [NEWS]  NEW STATUS
00500          BRA     LOOP1
00510 L3       LBSR    PRESET  ERASE CURRENT LOCATION
00520          LDD     $116    START OF PSEUDO RANDOM ROUTINE
00530          LDX     $118
00540          JSR     $9FB5
00550          LDD     $BF74   CONSTANT
00560          LEAY    D,Y
00570          STY     $116
00580          LDD     $BF76   CONSTANT
00590          LEAU    D,U
00600          STU     $118
00610          LDB     $117
00620          ANDB    #1      =0,1
00630          INCB            =1,2
00640          LSLB            =2,4
00650          SUBB    #3      =-1,+1
00660          STB     DX
00670          LDB     [NEWY]
00680          INCB            INCREASE CURRENT YCORD
00690          STB     [NEWY]
00700          CMPB    #120    COMPARE TO 120
00710          BLS     L4
00720          LDB     #2      CHANGE STATUS IF GREATER
00730          STB     [NEWS]
00740 L4       LDB     [NEWX]
00750          ADDB    DX      MOVE +1 OR -1
00760          STB     [NEWX]
00770          LBSR    PSET    PSET NEW LOCATION
00780 LOOP1    LDD     SS
00790          ADDD    #1
00800          CMPD    NN
00810          LBLS    L2
00820          JSR     $BF3B   RANDOM(0);CHANGE $116 & $118
00830          LDD     NN
00840          ADDD    #1
00850          CMPD    NUMBER
00860          LBLS    L1
00870
00880 L5       CLR     SAME    FLAG FOR 'ALL DONE'
00890          LDD     #0
00900 L6       STD     SS
00910          LDU     #STATUS
00920          LDX     #XCORD
00930          LDY     #YCORD
00940          LEAU    D,U
00950          STU     NEWS
00960          LEAX    D,X
00970          STX     NEWX
00980          LEAY    D,Y
00990          STY     NEWY
01000          LDB     [NEWS]
01010          CMPB    #3
01020          BEQ     LOOP2
01030          LDA     #1
01040          STA     SAME    NOT FINISHED YET
01050          CMPB    #2
01060          BEQ     CH2
01070          LBSR    PRESET
01080          LDD     $116
01090          LDX     $118
01100          JSR     $9FB5
01110          LDD     $BF74
01120          LEAY    D,Y
01130          STY     $116
01140          LDD     $BF76
01150          LEAU    D,U
01160          STU     $118
01170          LDB     $117
01180          ANDB    #1
01190          INCB
01200          LSLB
01210          SUBB    #3
01220          STB     DX
01230          LDB     [NEWY]
01240          INCB
01250          STB     [NEWY]
01260          CMPB    #120
01270          BLS     L7
01280          LDB     #2
01290          STB     [NEWS]
01300 L7       LDB     [NEWX]
01310          ADDB    DX
01320          STB     [NEWX]
01330          BSR     PSET
01340 LOOP2    LDD     SS
01350          ADDD    #1
01360          CMPD    NUMBER
01370          LBLS    L6
01380          JSR     $BF3B
01390          TST     SAME    ARE THEY ALL STATUS 3?
01400          LBNE    L5      IF NOT, BRANCH
01410          RTS             IF SO, END OF PROGRAM
01420
01430 CH1      LBSR    PPOINT  CHECK LOCATION DOWN 1
01440          TSTB
01450          BEQ     CH1L1
01460          LDB     #3      CAN'T MOVE ANYMORE
01470          STB     [NEWS]
01480          LBRA    LOOP1
01490 CH1L1    BSR     PRESET  ERASE CURRENT LOCATION
01500          INC     [NEWY]  MOVE DOWN 1
01510          BSR     PSET    PSET NEW LOCATION
01520          LBRA    LOOP1
01530
01540 CH2      BSR     PPOINT
01550          TSTB
01560          BEQ     CH2L1
01570          LDB     #3
01580          STB     [NEWS]
01590          BRA     LOOP2
01600 CH2L1    BSR     PRESET
01610          INC     [NEWY]
01620          BSR     PSET
01630          BRA     LOOP2
01640
01650 PSET     LDA     [NEWY]
01660          LDB     #32
01670          MUL
01680          ADDA    $BA
01690          TFR     D,X
01700          LDB     [NEWX]
01710          LSRB
01720          LSRB
01730          LSRB
01740          ABX
01750          LDA     [NEWX]
01760          ANDA    #7
01770          LDU     #$92DD
01780          LDA     A,U
01790          ORA     ,X
01800          STA     ,X
01810          RTS
01820
01830 PRESET   LDA     [NEWY]
01840          LDB     #32
01850          MUL
01860          ADDA    $BA
01870          TFR     D,X
01880          LDB     [NEWX]
01890          LSRB
01900          LSRB
01910          LSRB
01920          ABX
01930          LDA     [NEWX]
01940          ANDA    #7
01950          LDU     #$92DD
01960          LDA     A,U
01970          COMA
01980          ANDA    ,X
01990          STA     ,X
02000          RTS
02010
02020 PPOINT   LDA     [NEWY]
02030          INCA
02040          LDB     #32
02050          MUL
02060          ADDA    $BA
02070          TFR     D,X
02080          LDB     [NEWX]
02090          LSRB
02100          LSRB
02110          LSRB
02120          ABX
02130          LDA     [NEWX]
02140          ANDA    #7
02150          LDU     #$92DD
02160          LDB     A,U
02170          ANDB    ,X
02180          RTS
02190 STATUS   RMB     1536    MAXIMUM NUMBER OF BALLS
02200 XCORD    RMB     1536
02210 YCORD    RMB     1536
02220          END     START
```

Wake up and smell the CoCo!

Bring your drawings and designs to vivid, colorful life with the amazingly popular CoCo Max III!

NOW $39.95

Zoom! Rotate! Animate! 13 Fantastic Fonts! 40 paint brush shapes! CoCo Max III dazzles the eye! Get crisp, clear picture resolution (two full hi-res 320×192 screens)... a big, big edit window... 28 "eat-your-heart-out" drawing tools. Rotate at miniscule 1.5° angles. Undo boo-boos with a click. Animate for special effect. Pick'n'choose from 16 colors out of 64. Go absolutely fruity with fonts (8 sizes, 5 styles & more available!) and an astounding 40 different brush styles! No wonder this software is recognized as the CoCo community's all-time favorite!

Works with both 128K and 512K. Colors print in 5 shades of gray. Printers supported: Epson RX, FX, MX, LX and compatibles; Star/Gemini NX-10, NX-1000; DMP100, 105, 106, 110, 120, 130, 200; OKI 82A, 182, 192 CGP-220 (B&W).

CoCo Max III Add-Ons

Max Fonts disks: 95 fonts on 4 disks. ..... **Now only $29.95**
Or two sets of two disks each **$14.95**
Max Edit The font editor as creative as your imagination **Only $14.95**
Color Printer drivers NX-1000 Rainbow. CGP-220 and Okimate 20. For glorious color that wins hands down! **$14.95**

Get Max-10 – the CoCo word processor that's fun and furiously fast!

NOW AT LOWEST EVER PUBLISHED PRICE OF $34.95

Get that easy-as-pie Macintosh feel without giving up your first-born! This program will stretch your CoCo to the limit. Mix graphics, text, large headlines, arrange multiple columns, you name it... Max-10 will swiftly oblige. Includes paper-saving full-page preview (graphics, too!) to make your prose look proud. This is the CoCo word processor that will leave you speechless. Printers supported: Epson FX, MX, RX, LX and compatibles; DMP 105, 106, 130; CGP 220 (B&W); OKI 182, 92, 192; STAR NX-10, NX-1000.

Max-10 Add-Ons

Max-10 Fonts 36 super fonts on 2 disks. Call for list. .... **Now $14.95**
Spell Checker 35,000 word dictionary. Online spell checking to make you look the perfect professional. **$14.95**

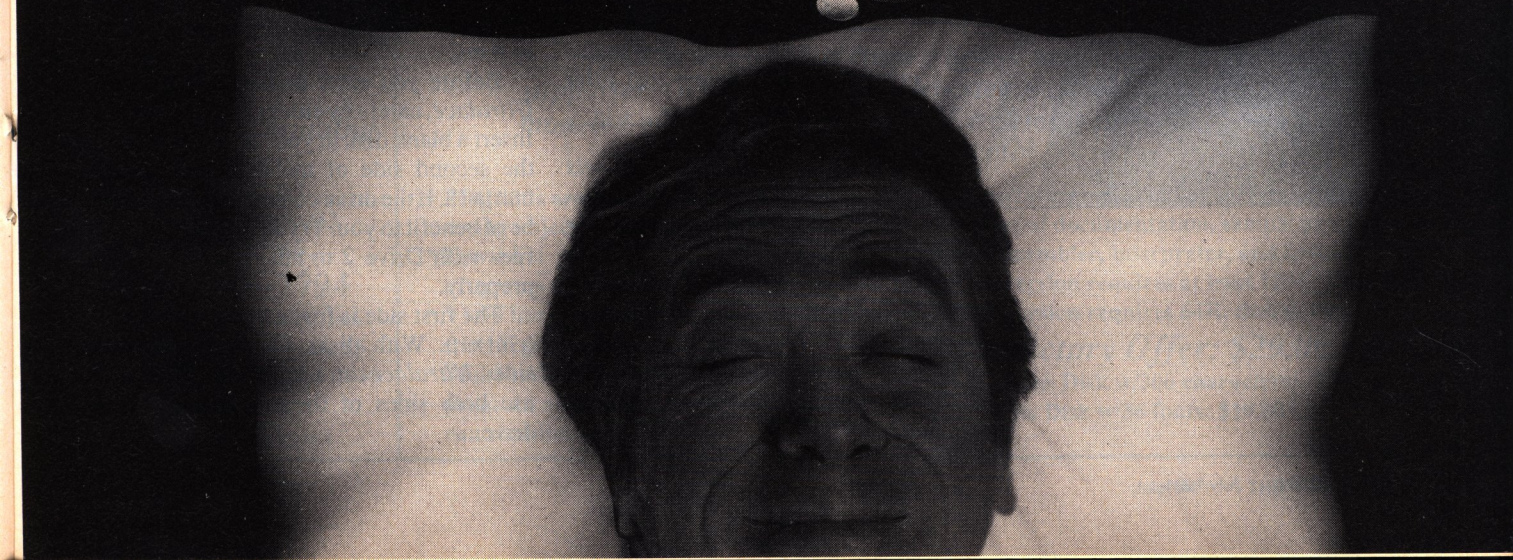
Buy both CoCo Max III and Max-10 $49.95

Call 1-800-221-0916 *1-203-259-7713*

How to order: Use Visa, Mastercard or M.O. C.O.D. add $4.00 extra. Purchase Orders subject to credit approval. Connecticut residents add 8% sales tax. Shipping $4.00 per order, usually UPS ground. UPS 2nd day air $6.00 extra. Next day service available. Canada: $6.00 per order (Airmail). Outside U.S. & Canada add 10% of order total.

COLORWARE

303 Linwood Ave.
Fairfield, CT 06430



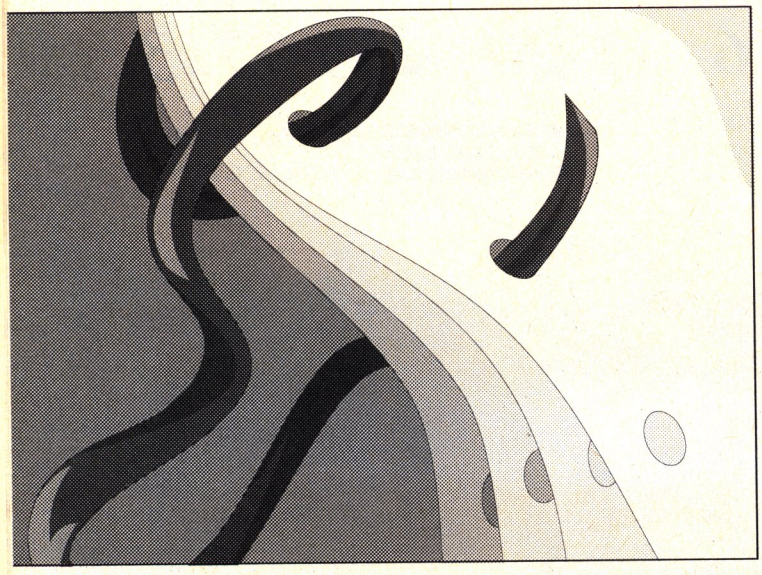
Two new versions of the ultimate shoestring desktop publisher

Ultralace: the Tandy Version

by H. Allen Curtis

Previously in this series, the primary focus was on the development of programs for generating auxiliary files employed by *Ultralace*. There are two versions of *Ultralace*: ULT is for users with Tandy printers, and ULE is for users with IBM/Epson-compatible printers. We'll present the Tandy version this month and hold ULE for next time. But don't let this stop you from reading the rest of this installment — much of what we'll discuss this time applies to ULE as well. In fact, the special instructions for entering either version are presented here.

Unless you own both types of printers (and like to type), you need only enter one version of the main program. The version you enter (ULT or ULE) depends on which program, GENMLT or GENMLE, you entered previously. If you have entered GENMLT, use this month's listing. If you have entered GENMLE, you need to wait until next time.



Tandy Printers

ULT was written to accommodate Tandy DMP-series printers that print 800 dots across the page and that use Tandy control codes. Those of you who have Tandy DMP-series printers that print 960 dots across the page will have to make a few changes in ULT. Specifically, insert

```
POKE4689,160:POKE4938,33:
```

between GOSUB410: and W=640 in Line 1 of ULT. In addition, make the changes indicated in Table 1.

Program Considerations

One of the evolutionary features of *Ultralace* is its ability to address four disk drives: 0, 1, 2 and 3. This feature eliminates the need for disk swapping if you have more than one drive. Many of you have only one drive, but this feature may still benefit you; many CoCo 3 owners now have double-sided disk drives and have not been able to use both sides with Disk BASIC. If you have such a drive and use Disk BASIC Version 1.1, Line 17 of ULT and ULE allows you to use both sides of the drive. After Line 17 has executed, the second side of Drive 0 can be addressed as Drive 2. If you have double-sided Drive 1, its second side can be addressed as Drive 3. Line 17 also allows your drive to operate more smoothly because it sets the disk-drive step rate (track-to-track) to 6 ms.

Before you enter any other portion of *Ultralace*, carefully enter Line 17 and run it. Insert a blank disk in your drive and format the second side of the disk by entering DSKINI2. If the drive comes on, Line 17 may be of benefit to you. Try saving and loading files with Drive 2 to ensure that it works properly.

The first side is formatted as usual with DSKINIO. With disks formatted on both sides, *Ultralace* can selectively address and use both sides of the double-sided disk drive.

H. Allen Curtis lives in Williamsburg, Virginia. He is interested in 17th and 18th century history and enjoys biking through the colonial capital. He balances past and present with his computer work. He can be contacted at 172 Dennis Drive, Williamsburg, VA 23815, (804) 229-7086. Please include an SASE when requesting a reply.

If Line 17 does not allow you to use both sides of the drive, turn the computer off and, after a suitable delay, on again. Then, when you enter Line 17 of ULT or ULE, insert an apostrophe (') after the first colon (:) to eliminate the nonbeneficial commands. If you are using *RAINBOW Check Plus* as an aid in checking the accuracy of your typing, make the insertion after you have completed all checks.

Those of you who have single-drive systems may also benefit from multiple-drive addressing in *Ultralace*. If you have 512K and a RAM disk program, you can address the disk drive as Drive 0 and the RAM disk as Drive 1, 2 or 3. Owners of multiple drives may occasionally want to use RAM disk facilities for faster input and output (I/O) from *Ultralace*. In either case, the auxiliary *Ultralace* File disk, or its backup copy, must be in Drive 0.

Line of ULT	Change From	To
9	31	21
9	50	60
11	48	41
11	33	40
24	20	19
386	336	416
386	248	304
388	232	288
396	392	472
396	264	320

Table 1: Changes for Printers

Line 17 is also employed to set the baud rate for your printer. As it stands, the first POKE statement in Line 17 sets the rate to 2400 baud, a common rate for printers. If your printer operates at a different rate, change the value 18 in the POKE command to 87, 41, 6 or 1 for 600, 1200, 4800 or 9600 baud, respectively. Again, if you use *RAINBOW Check Plus*, make the correction after you complete the checking process.

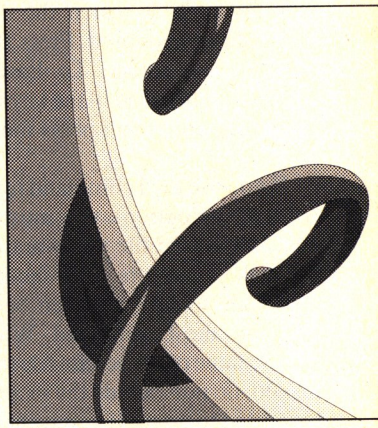
Enter all of ULT (or ULE) and save it to disk before you run it. Otherwise, because *Ultralace* uses the high-speed poke when it is not using input-output devices, you might save ULT or ULE at the improper speed. Save it on the File disk (or its backup with additional font files) you produced previously in this series.

Running Ultralace

With the File disk in Drive 0, run ULT (or ULE). After the title screen appears, the auxiliary files FMENU.HR1, DMENU.HR1, DMENU.HR2 and MLR.BIN are loaded. The Font-menu file is loaded into the memory area unused by BASIC (hexadecimal addresses $6E000 through $6FFFF). See Page 311 of the CoCo 3 manual for more details. The Design-menu files are loaded into the half of the high-resolution graphics screen memory that is unused by the *Ultralace* graphics modes. MLR.BIN is loaded into the standard (low-resolution, or PMODE) graphics-screen memory preceding either ULT or ULE.

The Font menu is displayed after the files are loaded. Pressing a letter A through Y selects a font (any fonts you have should be stored on the disk in Drive 0). If *Ultralace* doesn't find the selected font file on the disk, you will hear a beep alarm. After you select a font, the font file is loaded and *Ultralace*'s Command menu appears. The commands available from the Command menu are explained later in this series. In the meantime, experimentation is one of the best ways to learn *Ultralace*. A few hints about the commands might help.

The character keys on the CoCo keyboard are used to type characters in the selected font to the *Ultralace* screen. The precise functions of other keys are specified in a list that can be called with the K command — just press K. All commands can be called by pressing the associated upper- or lowercase letters. Those of you who have used *Desktop High* might notice that the list of keys has expanded considerably and has undergone a few other changes. After you finish digesting the list, return to the Command menu as instructed by the prompt. Initially, the main key to remember is F2, which calls the Command menu when you are working on the *Ultralace* screen.



Use the B command to go to the *Ultralace* screen. Try typing the character keys and any of the keys in the list you just studied. If you forget the purpose of any key, press F2 and K to get the key list again. Use the B command to get back to the *Ultralace* screen.

When you finish your initial testing of the keys, press F2 to call the Command menu. Note, the F command calls the Font menu so you can change fonts. Similarly, the A command calls the Design menu. To execute the A command, just press A. An introductory menu with six different options appears on the screen. For now, press 1 for the Normal option and you see the Design menu appear. Suppose you want to draw an arrow, or series of arrows, on the *Ultralace* screen. First, select Row 1 by

ACE

American Computing Equipment
P.O. Box 39281
Louisville, KY 40233
(502) 459-7966
1-800-346-2794
24 Hours. VISA/MC/Check
Shipping: US $3, Canada $5,
Other Countries $7
C.O.D. add $4
KY add 6% sales tax

NEW! Graphics Oriented Assembly Language

A brand new language from a brand new Color Computer supporter. GOAL (Graphics Oriented Assembly Language) is modeled after 68000 and VAX-11 assembly language to make programming in assembly easier.

* Programs are assembled into memory-saving object code
* Low-level principles mean GOAL programs execute fast
* V1.00 has over 200 instructions with 40 special graphics instructions
* Multi-tasking feature allows a BASIC program and many GOAL programs to run simultaneously
* 19 powerful memory-saving addressing modes
* 130 pages of documentation, sample programs, editor, assembler, interpreter, and fonts included
* CoCo 3 version requires at least 128K, disk drive
* CoCo 2 version requires 64K, disk drive
* ***Introductory Offer: $29.00***
* GOAL Icons Disk w/300 characters: $24.00
* ACE Fonts Disk w/36 fonts: $19.00

pressing 1. Next, type a lowercase "a" to select Slot a. After you make the complete selection, the Command menu reappears without displaying the selected design. The function of the display area is to act as a memory area at which the currently selected design is stored. Press B to return to the *Ultralace* screen. To draw the current design (as specified in the key list) hold the SHIFT key down and press the right arrow key.

If you use the I command (except for the ASCII string option), you must have previously saved the file you want loaded from the disk. Therefore, you should try the O command to save a screen before you investigate the I command. When entering the filename of the screen file to be saved or loaded, do not include the extension unless requested to do so. If you want to use a disk drive other than Drive 0, address the drive by including the filename with a colon (:) followed by the desired drive number.

For those who have a version of *Desktop High* that includes word-processor-input-file facilities, it should be pointed out that the C command of *Ultralace* provides the same function as the CONVERTH program used with *Desktop High*. For those of you who have a version of *Desktop High* with two- and three-column screen-dump capabilities, the H command automatically specifies the needed margin settings. Furthermore, the H command causes the automatic appending of the correct L, M, R and following number designations to the filename that you assign to the screens to be dumped.

If you make mistakes (such as trying to save a screen to an unformatted disk), you receive an error message and are given the option to continue using *Ultralace* or to exit. Some errors, such as SN or FC, will probably occur only if you have made a mistake when entering ULT or ULE. Therefore, your experimentation with *Ultralace* may also help locate typing errors.

Also, be warned that the BREAK key may not always respond instantaneously — you may have to press it several times before it works. You are then given the option to continue *Ultralace* or exit the program. If you choose to continue, the program takes you to the Command menu. BREAK can rescue you from unwanted situations caused by pressing keys by mistake.

RAINBOW ON TAPE/DISK Users

While space limitations prevent us from providing the listings for both ULT and ULE in the magazine this month, both versions appear on this month's RAINBOW ON TAPE and RAINBOW ON DISK.

In the Future

With the hints given, you should be able to discover the fundamentals of *Ultralace*. The listing for ULE appears next month. The month after that will be the final installment, in which we'll present more-detailed explanations of *Ultralace*'s operation. Until then, have fun experimenting.

In the meantime, three font-file disks are available from me at the address given above: Fonts T through Y ($5), Fonts J through Y ($12) and Fonts A through Y ($19). Please include payment to me by check or money order. ❑

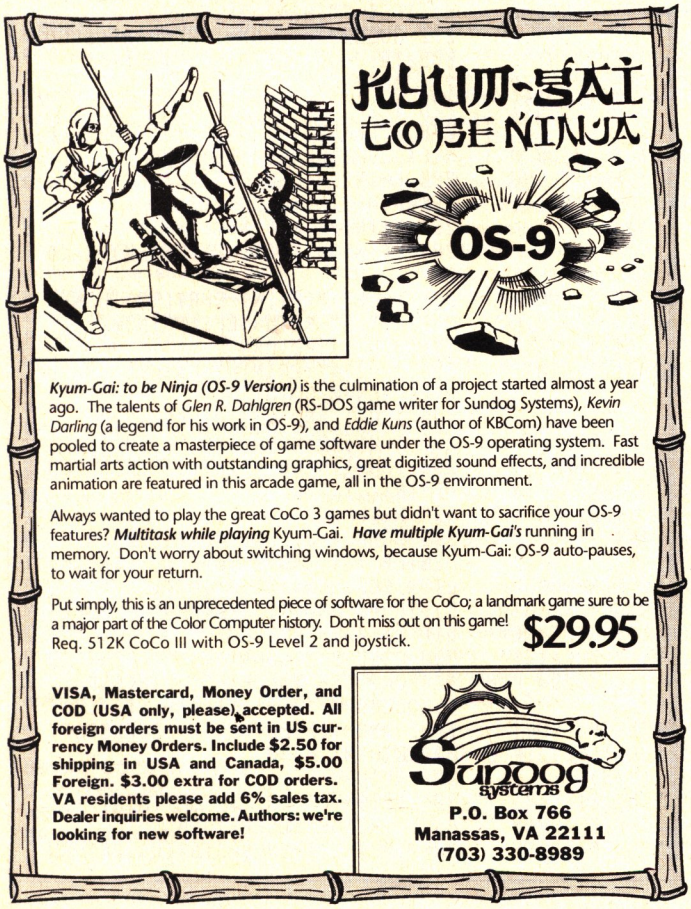
CoCo 3 Disk

```
5 ..... 16Ø    124 ..... 253    286 ..... 88    4ØØ ..... 1Ø
9 ..... 7       132 ..... 13Ø    3ØØ ..... 7Ø    41Ø ..... 76
12 ..... 24     148 ..... 73     31Ø ..... 255   422 ..... 96
18 ..... 234    16Ø ..... 253    316 ..... 195   436 ..... 192
28 ..... 124    18Ø ..... 7Ø     326 ..... 19Ø   452 ..... 166
38 ..... 123    2Ø2 ..... 3Ø     334 ..... 217   468 ..... 181
56 ..... 227    218 ..... 2Ø4    346 ..... 55    478 ..... 25Ø
72 ..... 173    23Ø ..... 56     358 ..... 4     488 ..... 174
84 ..... 93     244 ..... 77     37Ø ..... 2     5Ø4 ..... 139
98 ..... 176    252 ..... 158    378 ..... 62    END ..... 24
1Ø6 ..... 14    266 ..... 135    386 ..... 246
```

The Listing: ULT

```
1 PCLEAR1:CLEAR6ØØØ:CMP:WIDTH4Ø:
CLS3:GOSUB41Ø:W=64Ø:H=3:F1$="ABC
DEFGH":PF=VARPTR(F1$):PF=256*PEE
K(PF+2)+PEEK(PF+3)
2 O(2)=12Ø:O(3)=24Ø:O(4)=8Ø:A(1)
=27:A(2)=27:A(3)=28:B(2)=3:B(3)=
6:C(2)=3Ø:C(3)=4Ø:D(2)=1Ø:D(3)=1
7:E(1)=&H1294:E(2)=E(1):E(3)=E(1
):E(4)=&H12DF:F(1)=&H135F:F(2)=F
(1):F(3)=F(1):F(4)=&H13D7:G(1)=1
3:G(2)=13:G(3)=14:G(4)=14:GOTO15
3 P$=RIGHT$(STR$(I),1)+"/HR1":Q$
=RIGHT$(STR$(I),1)+"/HR2":RETURN
4 RENAMEF$+"L"+P$TO"L1/BIN":RENA
MEF$+"L"+Q$TO"L2/BIN":RETURN
5 POKE&HFFA1,&H7Ø:POKE&HFFA2,&H7
1:LOADM"L1",2*PEEK(&H13F5)+57344
:LOADM"L2",2*PEEK(&H13F5):RETURN
6 RENAME"L1/BIN"TOF$+"L"+P$:RENA
ME"L2/BIN"TOF$+"L"+Q$:RETURN
7 POKE4698,141:POKE4713,16:POKE4
732,141:POKE4741,1:POKE4742,33:P
OKE4745,8Ø:POKE4774,4:POKE4846,5
:GOSUB4Ø4:FORI=1TO4:POKE&H13F5,O
(I):GOSUB3:GOSUB4:GOSUB5:POKE&HF
FA1,121:POKE&HFFA2,122
8 GOSUB6:POKE&H137D,G(I):POKE&H1
29E,A(I):POKE&H12C7,B(I):GOSUB24
:EXECE(I):NEXT:RETURN
9 POKE4698,33:POKE4713,Ø:POKE473
2,33:POKE4741,31:POKE4742,3Ø:POK
E4745,5Ø:POKE4774,Ø:POKE4846,Ø:G
OSUB4Ø4:FORI=1TO4:POKE&H13F5,O(I
):GOSUB3:GOSUB4:RENAMEF$+"R"+P$T
O"R1/BIN":RENAMEF$+"R"+Q$TO"R2/B
IN"
1Ø GOSUB5:POKE&HFFA1,114:POKE&HF
FA2,115:LOADM"R1",2*PEEK(&H13F5)
+57344:LOADM"R2",2*PEEK(&H13F5):
POKE&HFFA1,121:POKE&HFFA2,122:RE
NAME"R1/BIN"TOF$+"R"+P$:RENAME"R
2/BIN"TOF$+"R"+Q$:GOTO8
11 POKE4741,48:POKE4742,3Ø:POKE4
745,33:GOSUB4Ø4:FORI=1TO4:POKE&H
13F5,O(I):P$=RIGHT$(STR$(I),1)+"
/HR":RENAMEF$+"L"+P$TO"L/BIN":RE
NAMEF$+"M"+P$TO"M/BIN":RENAMEF$+
"R"+P$TO"R/BIN"
12 POKE&HFFA2,112:LOADM"L",2*PEE
K(&H13F5):POKE&HFFA2,113:LOADM"M
",2*PEEK(&H13F5):POKE&HFFA2,114:
LOADM"R",2*PEEK(&H13F5):POKE&HFF
A2,122
13 RENAME"L/BIN"TOF$+"L"+P$:RENA
ME"M/BIN"TOF$+"M"+P$:RENAME"R/BI
N"TOF$+"R"+P$:POKE&H139Ø,C(I):PO
KE&H13BE,D(I):POKE&H137D,G(I):GO
SUB24:EXECF(I):NEXT
14 POKE&HFFA2,114:LOADM"DMENU/HR
1:Ø":POKE&HFFA2,122:RETURN
15 HCOLOR3,Ø:ON BRK GOTO332
16 LOADM"MLR":POKE&HFFA2,&H7Ø:LO
ADM"DMENU/HR1":POKE&HFFA2,&H71:L
OADM"DMENU/HR2":POKE&HFFA2,&H77:
LOADM"FMENU/HR1":POKE&HFFA2,&H7A
:EXEC&HFØØ
17 POKE15Ø,18:POKE55455,65:POKE5
5456,66:POKE55232,Ø:POKE55318,2Ø
18 ON ERR GOTO22
2Ø K$=K$+"C":A1=PEEK(VARPTR(K$)+
2):A2=PEEK(VARPTR(K$)+3):IFA2<2T
HENA2=254:A1=A1-1:GOTO36ELSEA2=A
2-2:GOTO36
22 POKE&HFFA2,&H7A:GOTO492
24 PRINT#-2,CHR$(27)CHR$(2Ø);:RE
TURN
26 GOSUB384:POKE&HFFA2,&H7Ø:SAVE
M"OUT1",&H4ØØØ,&H5FFF,&HAC73:POK
E&HFFA2,&H71:SAVEM"OUT2",&H4ØØØ,
&H5BFF,&HAC73:POKE&HFFA2,&H7A:RE
NAME"OUT1/BIN"TOF$+"/HR1":RENAME
"OUT2/BIN"TOF$+"/HR2":DRIVEØ:RET
URN
28 EXEC&HF3C:GOSUB384:POKE&HFFA2
,&H7Ø:SAVEM"OUT",&H4ØØØ,&H5DFF,&
HAC73:POKE&HFFA2,&H7A:RENAME"OUT
/BIN"TOF$+"/HR":DRIVEØ:RETURN
```

```
30 GOSUB404:RENAMEF$+"/HR1"TO"IN
1/BIN":RENAMEF$+"/HR2"TO"IN2/BIN
":POKE&HFFA2,&H70:LOADM"IN1":POK
E&HFFA2,&H71:LOADM"IN2":POKE&HFF
A2,&H7A
32 RENAME"IN1/BIN"TOF$+"/HR1":RE
NAME"IN2/BIN"TOF$+"/HR2":DRIVE0:
RETURN
34 GOSUB404:RENAMEF$+"/HR"TO"IN/
BIN":POKE&HFFA2,&H70:LOADM"IN":P
OKE&HFFA2,&H7A:RENAME"IN/BIN"TOF
$+"/HR":DRIVE0:EXEC&HF71:RETURN
36 L2=1:P=176:DIMF$(84),M(84):PO
KE&HFFD9,0
38 C1=63:PALETTE0,63:PALETTE1,63
:PALETTE2,63:PALETTE3,0
40 EXEC&H1000:POKE&HE6E4,&HE6:HS
CREENH:POKE&HE6E4,&HE7:HBUFF1,39
9:HGET(8,152)-(9,152+D),1
42 HBUFF4,3200:HBUFF5,2104:HGET(
0,0)-(639,19),4:HBUFF6,1520
44 EXEC&HF00:HGET(48,16)-(63,31)
,5:EXEC&HF00:DX=16:DY=16
46 PALETTE1,0
48 T=V:L=U:K$="F":GOTO138
50 IFZ=U AND L+4>W-1THENL=U:IFT<
P THENT=T+D+1
52 IFZ<>U AND L+4>W-1THENFL=1:GO
TO112
54 HGET(L,T)-(L+1,T+D),1:HLINE(L
,T)-(L+1,T+D),PSET,BF
56 POKE&H23,A1:POKE&H24,A2
58 IFSCI=1THEN420ELSEIFSCI=2 AND
 K$=1THEN428ELSEIFSCI=2THEN432
60 K$=INKEY$:IFK$=""THEN60
62 K=ASC(K$):IFK>64 AND K<91THEN
N=K-64:B=N:HLINE(L,T)-(L+1,T+D),
PRESET,BF:GOTO106
64 IFK>96 AND K<123THENN=K-96:B=
N+26:GOTO106
66 IFK>47 AND K<58THENN=K-47:B=N
+52:GOTO106
68 IFK>32 AND K<48THENN=K-32:B=N
+62:GOTO106
70 IFK>57 AND K<65THENN=K-57:B=N
+77:GOTO106
72 IFK=32THENZ=L+S:IFL+8<W THENH
LINE(L,T)-(L+7,T+D),PRESET,BF:L=
L+S:GOTO50ELSEHLINE(L,T)-(L+1,T+
D),PRESET,BF:L=U:IFT<P AND T<191
-2*D THENT=T+1+D:GOTO50ELSEFL=0:
GOTO444
74 IFK=13THENHPUT(L,T)-(L+1,T+D)
,1:L=U
76 IFK=13 AND T<P THENT=T+1+D:GO
TO54ELSEIFK=13THEN54
78 IFK=8THENL=2*INT(.5*L):HLINE(
L,T)-(L+1,T+D),PRESET,BF:IFL>1TH
ENL=L-2:GOTO50ELSEL=0:GOTO50
80 IFK=93THENIFH=1THENSOUND60,9:
GOTO50ELSEZ=U:HLINE(L,T)-(L+1,T+
D),PRESET,BF:IFL+DX-1<W THENL=8*
INT(.125*L):HPUT(L,T)-(L+DX-1,T+
DY-1),5:L=L+DX:GOTO50ELSESOUND60
,9:GOTO50
82 IFK=94THENHPUT(L,T)-(L+1,T+D)
,1:IFT>D THENT=T-1-D:GOTO50
84 IFK=10THENHPUT(L,T)-(L+1,T+D)
,1:IFT+D<191THENT=T+D+1:GOTO50
86 IFK=91THENZ=U:HPUT(L,T)-(L+1,
T+D),1:HDRAW"BM"+STR$(L)+","+STR
$(T+1+INT(.75*D))+"R4":L=L+4:GOT
050:IFL>W-5THENL=L-4:GOTO50
88 IFK=9 AND L+4<W THENHPUT(L,T)
-(L+1,T+D),1:L=L+4:GOTO50
90 IFK=92THENEXEC&H1000:T=V:L=U:
GOTO50
92 IFK=4THENHPUT(L,T)-(L+1,T+D),
1:GOTO128
94 IFK=12THENHPUT(L,T)-(L+1,T+D)
,1:IFT3=0THENT3=1:L=T1:GOTO50ELS
EIFT3=1THENT3=0:L=T2:GOTO50
96 IFK=189THENGOSUB374
98 IFK=21THENHPUT(U,T)-(W-1,T+.5
*D),4:HPUT(U,T+.5*D)-(W-1,T+D),4
:L=U:GOTO50
100 IFK=95THENI=2*H+2:HPUT(L,T)-
(L+1,T+D),1:IFL>W*.5THENHGET(U,T
)-(W-I-1,T+.5*D+.5),6:HPUT(U+I,T
)-(W-1,T+.5*D+.5),6:HGET(U,T+.5*
D+1.5)-(W-I-1,T+D),6:HPUT(U+I,T+
.5*D+1.5)-(W-1,T+D),6:GOTO104
102 IFK=95THENHGET(U+I,T)-(W-1,T
+.5*D+.5),6:HPUT(U,T)-(W-1-I,T+.
5*D+.5),6:HGET(U+I,T+.5*D+1.5)-(
W-1,T+D),6:HPUT(U,T+.5*D+1.5)-(W
-1-I,T+D),6
104 IFK<>95THENHPUT(L,T)-(L+1,T+
D),1:GOTO50ELSE50
106 HLINE(L,T)-(L+1,T+D),PRESET,
BF:IFL+M(B)<W THENGOSUB126:L=L+2
*INT(.5+M(B)*.5)+2:IFL>W-1THENL2
=L-W+1:L=W-1:GOTO50ELSE50
108 IFZ=U THENL=U:IFT<P AND T<19
1-2*D THENT=T+D+1:GOTO62ELSE62
110 FL=2
112 IFH=3THENZ1=8*INT(.125*Z)
114 IFH=1THENZ1=4*INT(.25*Z)
```

Kyum-Gai: to be Ninja (OS-9 Version) is the culmination of a project started almost a year ago. The talents of *Glen R. Dahlgren* (RS-DOS game writer for Sundog Systems), *Kevin Darling* (a legend for his work in OS-9), and *Eddie Kuns* (author of KBCom) have been pooled to create a masterpiece of game software under the OS-9 operating system. Fast martial arts action with outstanding graphics, great digitized sound effects, and incredible animation are featured in this arcade game, all in the OS-9 environment.

Always wanted to play the great CoCo 3 games but didn't want to sacrifice your OS-9 features? ***Multitask while playing*** Kyum-Gai. ***Have multiple Kyum-Gai's*** running in memory. Don't worry about switching windows, because Kyum-Gai: OS-9 auto-pauses, to wait for your return.

Put simply, this is an unprecedented piece of software for the CoCo; a landmark game sure to be a major part of the Color Computer history. Don't miss out on this game! Req. 512K CoCo III with OS-9 Level 2 and joystick. **$29.95**

VISA, Mastercard, Money Order, and COD (USA only, please) accepted. All foreign orders must be sent in US currency Money Orders. Include $2.50 for shipping in USA and Canada, $5.00 Foreign. $3.00 extra for COD orders. VA residents please add 6% sales tax. Dealer inquiries welcome. Authors: we're looking for new software!

Sundog systems

P.O. Box 766
Manassas, VA 22111
(703) 330-8989

MLBASIC 2.0 - BASIC Compiler

If you want your BASIC programs to run up to 50 times faster, or want more programming features without learning another language, MLBASIC is for you.

MLBASIC is the most compatible BASIC compiler available for the Color Computer. WHY? Because MLBASIC fully supports:

- Low- and high-resolution graphics
- All types of I/O (disk, screen, printer, RS232)
- All available commands offered with BASIC
- Floating point functions and expressions
- Integer, floating point and string type variables and arrays
- Use of all available 512K RAM in the COCO 3
- 80,40 or 32 column text displays

MLBASIC not only contains everything that you would expect a BASIC programming language should contain, MLBASIC has features that offer flexibility of other languages like C, Pascal, FORTRAN and even assembly language. These features will allow programmers to directly access the CPU registers on the COCO, produce modular program code with SUBROUTINES, manipulate memory in blocks, and even call ROM routines in other areas of memory.

MLBASIC revision 2.0 has incorporated all enhancements that were suggested by MLBASIC 1.0 users and more. Revision 2.0 did away with all the incompatibility problems that existed with revision 1.0.

MLBASIC allows for the first time user to quickly compile a program using default compiler settings. The advanced user has the capability of controlling over a dozen settings which control where the program is compiled, which medium to compile to (memory or disk), string space, compiler listings and more.

With all this going for MLBASIC, your might expect the cost to be a little out of your budget. After looking at prices of other BASIC compilers for the COCO 3 you might be correct. But look again at this ad; for only $59.95, you can have a programming language that will spark your interest once again in the COCO.

Before you buy another BASIC compiler for the COCO, find out if it supports everything MLBASIC supports. Then look at the price tag. We feel that it won't be long before you place an order for MLBASIC.

"MLBASIC is a fine program for any serious programmer," said David Gerald in the December 1987 RAINBOW.

<<<<< ONLY $59.95 >>>>>

COCO 3 WITH DISK REQUIRED -Add $4.00 Postage.
Check, Money Order or COD accepted
Foreign orders use U.S. MONEY ORDERS only.

WASATCHWARE
7350 Nutree Drive
Salt Lake City, Utah 84121
Phone (801) 943-1546

```
116 Z=Z1
118 HGET(Z,T)-(L,T+D),6:HPUT(Z,T
)-(L,T+D),4:L1=L-Z:L=U:Z=U:IFT<P
 AND T<191-2*D THENT=T+D+1ELSE44
4
120 IFL+L1<ØTHENL1=L1+2:GOTO12Ø
122 IFSCI<>2THENHPUT(L,T)-(L+L1,
T+D),6:L=L+L1+L2:L=2*INT(.5*L+.5
):L2=ØELSEL=U:GOSUB476:KS=KS+1:G
OTO432
124 N=FL+1:ON N GOTO5Ø,54,62
126 HDRAW"BM"+STR$(L)+","+STR$(T
)+F$(B):RETURN
128 HSCREEN0:CLS:ATTRØ,4:LOCATE1
Ø,4:PRINT"A: ART-DESIGNS":LOCATE
1Ø,5:PRINT"B: BACK TO SCREEN":LO
CATE1Ø,6:PRINT"C: CONVERT WPF":L
OCATE1Ø,7:PRINT"D: DIR":LOCATE1Ø
,8:PRINT"F: FONT SELECT
13Ø LOCATE1Ø,9:PRINT"H: HOUSEKEE
PING":LOCATE1Ø,1Ø:PRINT"I: INPUT
":LOCATE1Ø,11:PRINT"K: KEYS LIST
ED":LOCATE1Ø,12:PRINT"M: MARGIN
SET":LOCATE1Ø,13:PRINT"O: OUTPUT
":LOCATE1Ø,14:PRINT"P: PRESENT S
TATUS
132 LOCATE1Ø,15:PRINT"R: RESOLUT
ION CHANGE":LOCATE1Ø,16:PRINT"S:
 SCREEN DUMP":LOCATE1Ø,17:PRINT"
T: TAB SET":LOCATE1Ø,18:PRINT"X:
 EXIT UltraLace":LOCATE14,18:POK
E&H23,A1:POKE&H24,A2:POKE&HFFD8,
Ø
134 K$=INKEY$:IFK$=""THEN134
136 IFK$="D" OR K$="d"THENGOSUB3
26:GOTO128
138 IFK$="F" OR K$="f"THENOD=D:L
1=L:EXEC&HF8E:POKE&HE6E4,&HE6:HS
CREEN3:POKE&HE6E4,&HE7:GOSUB17Ø:
L=L1:EXEC&HF8E:GOTO128
14Ø IFK$="B" OR K$="b"THEN168
142 IFK$="H" OR K$="h"THENGOSUB3
24:GOTO396
144 IFK$="I" OR K$="i"THEN482
146 IFK$="K" OR K$="k"THENGOSUB3
Ø8:GOTO128
148 IFK$="O" OR K$="o"THENIFCC=Ø
 AND HK=ØTHEN348ELSEIFCC=ØTHEN34
6ELSEF$=LEFT$(F1$,HL):DRIVEVAL(R
IGHT$(F$,1)):F$=LEFT$(F$,HL-2):I
FHK=3THENCLS:GOSUB28:GOTO128ELSE
CLS:GOSUB26:GOTO128
15Ø IFK$="M" OR K$="m"THENGOSUB2
18:GOTO128
152 IFK$="P" OR K$="p"GOSUB4ØØ:G
OTO128
154 IFK$="R" OR K$="r"THENIFH=1T
HENH=3:U=2*U:W=2*W:T1=2*T1:T2=2*
T2:GOTO128ELSEH=1:U=.5*U:W=.5*W:
T1=.5*T1:T2=.5*T2:GOTO128
156 IFK$="T" OR K$="t"THENGOSUB2
98:GOTO128
158 IFK$="C" OR K$="c"THEN252
16Ø IFK$="S" OR K$="s"THENGOSUB3
24:GOSUB322:IFK$="1"THENGOSUB7:G
OTO128ELSEIFK$="2"THENGOSUB9:GOT
O128ELSEIFK$="3"THENPOKE&H13FF,Ø
:GOSUB11:GOTO128ELSESOUND6Ø,9:GO
TO128
162 IFK$="A" OR K$="a"THEN33Ø
164 IFK$="X" ORK$="x"THENGOSUB39
4:IFK$="Y" OR K$="y"THENCLS3:POK
E&HFFD8,Ø:DRIVEØ:ENDELSE128
166 SOUND6Ø,5:SOUND6Ø,5:GOTO128
168 POKE&HE6E4,&HE6:HSCREENH:POK
E&HE6E4,&HE7:POKE&HFFD9,Ø:GOTO2Ø
2
17Ø GOTO2Ø4
172 POKE&H23,A1:POKE&H24,A2:GOSU
B322
174 IFK$<"Ø" OR K$>"9" THENSOUND
6Ø,1Ø:RETURNELSEK$="1"+K$
176 GOSUB212
178 GOSUB216
18Ø OPEN"I",#1,"FONT"+K$
182 FORI=1TO84:LINEINPUT#1,F$(I)
:NEXT
184 FORI=1TO84:INPUT#1,M(I):NEXT
186 INPUT#1,D,S:CLOSE#1:IFD>7 AN
D D<11THEND=11ELSEIFD>11 AND D<1
5THEND=15ELSEIFD>15THEND=23
188 K=T
19Ø T=T+INT(.5*(OD-D)):V=T:IFT<Ø
THENT=Ø:V=ØELSEIFT>P THENT=P-1
192 IFV>=ØTHENV=V-D-1:GOTO192ELS
EV=V+D+1
194 IFK=ØTHENGOSUB424:GOSUB25Ø
196 RETURN
198 HPUT(16,2Ø)-(111,17Ø),5
2ØØ GOSUB25Ø
2Ø2 HGET(L,T)-(L+1,T+D),1:GOTO5Ø
2Ø4 POKE&H23,A1:POKE&H24,A2:GOSU
B322
2Ø6 K=ASC(K$):IFK>96 AND K<122TH
ENK=K-32:K$=CHR$(K)
2Ø8 IFK>64 AND K<9ØTHEN176ELSESO
UND6Ø,9:GOTO2Ø4
21Ø POKE&H23,A1:POKE&H24,A2:RETU
RN
212 POKE&H23,A1-1:POKE&H24,A2:RE
TURN
214 POKE&H23,A1-2:POKE&H24,A2:RE
TURN
216 POKE&H23,A1-4:POKE&H24,A2:RE
TURN
218 GOSUB212:CLS:LOCATE6,8:PRINT
"ENTER TOP MARGIN (Ø - 1Ø): ";:L
INEINPUTV$:LOCATE6,1Ø:PRINT"ENTE
R LEFT MARGIN ";:IFV$=""THENV$=S
TR$(V)
22Ø LOCATE24,1Ø:IFH=1THENPRINT"(
Ø - 2ØØ):      ":LOCATE35,1ØELSEP
RINT"(Ø - 4ØØ):      ":LOCATE35,1
Ø
222 GOSUB214:LINEINPUTU$:GOSUB3Ø
6:V=VAL(V$):U=VAL(U$):IFH=1THENU
=4*INT(.25*U):Z=U ELSEU=8*INT(.1
25*U):Z=U
224 IFV<ØTHENV=Ø
226 IFV>1ØTHENV=1Ø
228 IF U>W-5ØTHENSOUND6Ø,5:LOCAT
E1Ø,15:PRINT"LEFT MARGIN TOO BIG
":LOCATE8,16:PRINT"RELATIVE TO R
IGHT MARGIN!":LOCATE14,17:PRINT"
TRY AGAIN.":GOTO22Ø
23Ø IFU<ØTHENU=Ø
232 IFH=1 AND U>2ØØTHENU=2ØØ
234 IFH=3 AND U>4ØØTHENU=4ØØ
236 GOSUB212:LOCATE4,12:PRINT"EN
TER RIGHT MARGIN ( Ø -";32Ø+(H-1
)*16Ø;"): ";:LINEINPUTW$:IFW$=""
THENW$=STR$(W)
238 W=VAL(W$):IFW<U+5ØTHENSOUND6
Ø,5:LOCATE9,15:PRINT"RIGHT MARGI
N TOO SMALL":LOCATE8,16:PRINT"RE
LATIVE TO LEFT MARGIN. ":LOCATE1
4,17:PRINT"TRY AGAIN.":GOTO236
24Ø GOSUB29Ø
242 CLS:LOCATE6,12:PRINT"DO YOU
WANT TO CHANGE THE":LOCATE6,13:P
RINT"BOTTOM MARGIN?  (Y/N) ";
244 GOSUB322:IFK$="N" OR K$="n"
OR ASC(K$)=13THENL=U:T=V:RETURNE
LSEIFK$="Y" OR K$="y"THEN246ELSE
SOUND6Ø,5:GOTO244
246 LOCATE6,16:PRINT"DO YOU WANT
 IT AT THE MOST":LOCATE6,17:PRIN
T"RECENT CURSOR POSITION?  (Y/N)
 ":LOCATE6,18:PRINT"IF NOT, IT W
ILL BE SET TO THE":LOCATE6,19:PR
INT"LOWEST POSSIBLE CURSOR POSIT
ION.":LOCATE37,17
248 GOSUB322:IFK$="N" OR K$="n"T
HENGOSUB424:GOTO25ØELSEIFK$="Y"
OR K$="y"THENP=T:L=U:T=V:RETURNE
LSESOUND65,Ø:GOTO248
25Ø P=V+(D+1)*(-1+INT((192-V)/(D
+1))):RETURN
252 GOSUB212:CLS:LOCATE5,8:PRINT
"FILENAME INCLUDING EXTENSION:":
LOCATE13,9:LINEINPUTF$:Z$=RIGHT$
(F$,2):IFASC(Z$)=58THENDRIVEVAL(
RIGHT$(Z$,1)):F$=LEFT$(F$,LEN(F$
)-2)ELSEDRIVEØ
254 N=INSTR(F$,"/"):IFN=ØTHEN252
ELSEG$=LEFT$(F$,N)+"DAT"
256 J=Ø:IFRIGHT$(F$,3)="DAT"THEN
RENAMEF$TOLEFT$(F$,N)+"TXT":F$=L
EFT$(F$,N)+"TXT"
258 OPEN"D",#1,F$:FIELD#1,128 AS
 A$,128 AS B$
26Ø CLOSE#2:OPEN"O",#2,G$
262 IFDN=1THEN288ELSEGOSUB21Ø:J=
J+1:GET#1,J:C$=A$
264 B=INSTR(B$,"]"):IFINSTR(A$,"
]")>Ø OR B>ØTHENDN=1:IFB>ØTHENB$
=LEFT$(B$,B-1)ELSEC$=LEFT$(C$,IN
STR(C$,"]")-1):B$=""
266 N=INSTR(C$,CHR$(13)):IFN>ØTH
ENGOSUB286:C$=RIGHT$(C$,LEN(C$)-
N):IFC$=""THENC$=B$:GOTO27ØELSE2
66
268 GOSUB276:C$=C$+B$
27Ø N=INSTR(C$,CHR$(13)):IFN>ØTH
ENGOSUB286:C$=RIGHT$(C$,LEN(C$)-
N):IFC$=""THEN262ELSE27Ø
272 GOSUB276:IFDN=1THEN288ELSEGO
SUB21Ø:J=J+1:GET#1,J:C$=C$+A$
274 GOTO264
276 I=1
278 IFLEN(C$)=I OR C$=STRING$(LE
N(C$),32)THENK=Ø:GOTO284
28Ø K=INSTR(LEN(C$)+1-I,C$," "):
IFK=ØTHENI=I+1:GOTO278
282 PRINT#2,LEFT$(C$,K-1)
284 C$=RIGHT$(C$,LEN(C$)-K):RETU
RN
286 IFLEFT$(C$,N)=CHR$(13)THENPR
INT#2," [":RETURNELSEPRINT#2,LEF
T$(C$,N-1):RETURN
288 CLOSE#1:PRINT#2,C$:CLOSE#2:D
RIVEØ:DN=Ø:GOTO128
29Ø IFH=1 AND W>32ØTHENW=32Ø
292 IFW>64ØTHENW=64Ø
294 IFH=1THENW=4*INT(.25*W)ELSEW
=8*INT(.125*W)
296 RETURN
298 GOSUB212:CLS:LOCATE6,8:PRINT
"ENTER 1ST TAB VALUE: ";:LINEINP
UTT$:GOSUB3Ø4:T1=2*INT(VAL(T$)*.
5):IFH=1 AND T1>32ØTHENT1=32ØELS
EIFT1>64ØTHENT1=64Ø
3ØØ GOSUB212:LOCATE6,12:PRINT"EN
TER 2ND TAB VALUE: ";:LINEINPUTT
$:GOSUB3Ø4:T2=2*INT(VAL(T$)*.5):
IFH1 AND T2>32ØTHENT2=32ØELSEIFT
2>64ØTHENT2=64Ø
3Ø2 RETURN
3Ø4 IFT$="c" OR T$="C" THENT$=ST
R$(L):RETURNELSERETURN
3Ø6 IFU$=""THENU$=STR$(U):RETURN
```

```
ELSERETURN
308 CLS:LOCATE2,2:PRINT"F2:
     CALL COMMAND MENU":LOCATE2,
3:PRINT"RIGHT ARROW: MOVE CURSOR
 RIGHT":PRINT"  LEFT ARROW:  BAC
KSPACE":PRINT"  UP ARROW:    MOV
E CURSOR UP 1 LINE":PRINT"  DOWN
 ARROW:  MOVE CURSOR DOWN 1 LINE
310 LOCATE2,7:PRINT"ENTER:
 CARRIAGE RETURN &":LOCATE15,8:P
RINT"MOVE CURSOR DOWN 1 LINE":PR
INT"  CLEAR:       TAB":LOCATE7,
11:ATTR0,4,U:PRINT"KEYS WITH SHI
FT HELD DOWN";:ATTR0,4
312 LOCATE2,13:PRINT"RIGHT ARROW
: DRAW CLIP ART":PRINT"  LEFT AR
ROW:  CLEAR LINE":PRINT"  UP ARR
OW:    MOVE CHAR-LINE TOWARD":LO
CATE15,16:PRINT"CURSOR HALF OF S
CREEN":PRINT"  DOWN ARROW:  UNDE
RLINE":PRINT"  CLEAR:       CLEA
R SCREEN
314 PRINT"  0:            UPPER/L
OWER CASE":LOCATE4,22:ATTR0,4,U:
PRINT"PRESS SPACE FOR REST OF KE
Y LIST";:ATTR0,4:LOCATE4,22:E$="
      STOPPED BY ANY KEY OR MA
RGIN":GOSUB322
316 CLS:LOCATE6,5:ATTR0,4,U:PRIN
T"KEYS PRESSED AFTER CTRL KEY";:
ATTR0,4:LOCATE2,7:PRINT"RIGHT AR
ROW: MOVE CURSOR RIGHT UNTIL"+E$
:PRINT"  LEFT ARROW:  MOVE CURSO
R LEFT UNTIL "+E$
318 LOCATE2,11:PRINT"UP ARROW:
  MOVE CURSOR UP UNTIL   "+E$:PR
INT"  DOWN ARROW:  MOVE CURSOR D
OWN UNTIL "+E$
320 LOCATE5,22:PRINT"PRESS ";:AT
TR0,4,U:PRINT"SPACE";:ATTR0,4:PR
INT" TO RETURN TO MENU";:LOCATE1
2,22
322 K$=INKEY$:IFK$=""THEN322ELSE
RETURN
324 CLS:LOCATE8,10:PRINT"1: 1COL
UMN/4SCREEN":LOCATE8,11:PRINT"2:
 2COLUMN/8SCREEN":LOCATE8,12:PRI
NT"3: 3COLUMN/12SCREEN":RETURN
326 GOSUB212:CLS:LOCATE12,8:PRIN
T"DRIVE NUMBER: "
328 GOSUB322:K=VAL(K$):IFK>3THEN
SOUND60,9:GOTO328ELSEDIRK:PRINT"
  FREE GRANULES:";FREE(K):PRINT"
     PRESS SPACE TO CONTINUE":GO
SUB322:RETURN
330 CLS:LOCATE10,8:PRINT"1: NORM
AL":LOCATE10,9:PRINT"2: DOUBLE W
IDTH":LOCATE10,10:PRINT"3: DOUBL
E WIDTH-LENGTH":LOCATE10,11:MI$=
": MIRROR IMAGE OF ":PRINT"4";MI
$;"1":LOCATE10,12:PRINT"5";MI$;"
2":LOCATE10,13:PRINT"6";MI$;"3":
GOTO354
332 GOSUB394:IFK$="Y" OR K$="y"T
HEN334ELSE128
334 CLS3:POKE&HFFD8,0:DRIVE0
336 IFERNO>-1 AND PEEK(&H13FF)<>
9THENPOKE&HFFA1,121:POKE&HFFA2,1
22ELSEEND
338 IFERNO<25THENAD=&HABAF+ERNO*
2ELSEIFERNO>26THENAD=&HC290+2*(E
RNO-27)ELSEAD=&H890D
340 WIDTH40:LOCATE8,10:PRINT" ";
:PRINTCHR$(PEEK(AD))CHR$(PEEK(AD
+1));" ERROR IN LINE";ERLIN
342 LOCATE12,14:PRINT"CONTINUE?
(Y,N)":GOSUB322:IFK$="Y" OR K$="
y"THENWIDTH40:CLS5:PALETTE0,63:P
ALETTE1,0:GOTO128
344 END
346 GOSUB404:IFHK=3THENGOSUB28:G
OTO128ELSEGOSUB26:GOTO128
348 CLS:LOCATE8,10:PRINT"1: SAVE
 FULL SCREEN":LOCATE8,12:PRINT"2
: SAVE HALF SCREEN"
350 GOSUB322:IFK$="1"THENGOSUB40
4:GOSUB26:GOTO128ELSEIFK$="2"THE
NGOSUB404:GOSUB28:GOTO128ELSESOU
ND60,9:GOTO128
352 GOSUB322:GOTO128
354 GOSUB322:K=VAL(K$):IFK<1 OR
K>6THENSOUND60,9:GOTO354ELSEIFK>
3THENPOKE&H102A,1:K=K-3ELSEPOKE&
H102A,0
356 DK=K:POKE&H1027,K:CLS:EXEC&H
F00:POKE&HE6E4,&HE6:HSCREEN3:POK
E&HE6E4,&HE7
358 GOSUB322:K=ASC(K$):IFK<48 OR
 K>51THENSOUND60,9:GOTO358ELSEK=
K-48:DX=(K+1)*16:POKE&H1028,2*K+
3:IFK>0THEN368
360 GOSUB322:K=ASC(K$):IFK>96 AN
D K<123THENK=K-97ELSEIFK>64 AND
K<77THENK=K-39ELSESOUND60,9:GOTO
360
362 POKE&H1029,K:EXEC&H1033:IFDX
>48THENDX=48
364 DY=DX:IFDK>1THENDX=2*DX:IFDK
```


SALE! Buy Now At Lowest Prices.

BANKMAN. Continuously updates your checkbook. Save, Edit and print files. Lets you analyze spending; reconciles, summarizes banking transactions. Uses 32K. Manual. . . $29.95
CHECK WRITER. Uses your printer and standard bank checks to help handle your accounts. Saves files, reloads, edits and pauses printer to let you write in amounts. Manual. . $19.95
GENERAL STATISTICS. Computes over 50 stats, including Standard deviation & error, Covariance, Correlation, Chi-Square and ANOVA. Includes screen tables and manual. Edits, Saves and Prints data. User friendly. Has Manual. . . $29.95
ENVELOPE WRITER. Prints return and mailing addresses directly on the envelope with a DWP or on tractor envelopes with a DMP. Saves on labels! Memorizes return addresses. Prints with custom fonts on TANDY printers. Uses 16K. . . . $17.95
BASEBALL STATS. Keeps track of 20 statistics. Continuously updates. Full of options! Uses 32K. Includes Manual. $29.95
QUICK STATS. A Baseball Scoreboard! Keeps track of over a dozen stats. Lets you save, edit and print out data. . . $22.95
BALL CARDS. A database for baseball card collectors. .$19.95
BRAINBUSTERS. Multiple Choice/True-False Test Writing program. Lets you Save, Edit, Select, Randomize & Print. Many more options! Use professionally or for fun. . . $29.95
THE EXAMINER. Use with above program to take "On Screen" tests. Grades and Saves results. For home or class. . . $19.95
TRIVIA 1-3. Try these BRAINBUSTER quizzes. Each. . . $5.95
INVENTORY MANAGER from Forrest Enterprises. Writes invoices, keeps track of stock, saves time & money. . . .$24.95
COCO LABELS. Prints fancy fonts w/TANDY printers. Select names from alphabetical screen index. Prints dups. . $19.95
CALCULATOR. One of a kind. Prints out! Simulates adding machine. All standard functions plus 7 memory banks.$14.95

Specify COCO 1, 2 or 3. Disk Only. Send check or money order. Add $3.00 Shipping/Handling. In IL add 6.25% Sales Tax.

TRADING POST

DISTRIBUTORS OF 5-STAR SOFTWARE

P.O. BOX 3453 CARBONDALE, IL 62902

GRANITE COMPUTER SYSTEMS

MODEMS

NEW 9600 Baud V.32/V.42/V.42bis data modems. MNP1-5LAPM.
Error Correction and data compression (much higher effective throughput — as much as 38400 Baud). **External — call for price**

NEW PRICE 2400 Baud V.42/V.42bis data modems. MNP1-5/LAPM.
Error correction and data compression (much higher effective throughput — as much as 9600 Baud). **External $189 (+$7 S&H).**

NEW PRODUCT 9600 Baud Send/Receive Fax modems.
Send/Receive text/graphics files from/to your computer/any Fax machine in the world. Full 2400 Baud data modem capabilitiy.
Includes software. **External $149/Internal $139 (+$5 S&H)**

NEW PRICE 9600 Baud SendFax modems.
Send text/graphics files from your computer to any Fax machine in the world. Full 2400 Baud data modem capability. Includes software. **External $129/Internal $119 (+$5 S&H)**

NEW PRICE 2400 Baud Data modems **External $109/Internal $99 (+$5 S&H)**

These are all high quality modems made by Zoom Telephonics in the USA. Fully Hayes compatible. Two year mfg warranty. Software available.

S&H Canada (Air PP and Ins) V.42/v.42bis $12.00 Sendfax/Data $8.00

GCS FILE TRANSFER UTILITIES — Version 3.0

The GCS File Transfer Utilities provide a simple and quick method to transfer text/binary files from/to a variety of floppy disk formats.

Commands PC, RS, FLEX disks: Dir, Dump, Read, Write
PC disks: Rename, Delete, Format

Handles most 5.25 and 3.5 formats. Any level sub-directories (PC). Binary files. Use pipes for multiple file transfers. Multi-Vue version can be used under Multi-Vue or as stand alone Shell commands.

Requires OS-9 L2 for COCO 3, L1 for COCO 1 or 2. 2 drives (one can be hard/ramdisk, one floppy 40 T DD DS). Multi-Vue for Multi-Vue version. SDISK3 for COCO3 - SDISK for COCO 1 or 2. Multi-Vue version $54.95 Standard version $44.95
V3.0 updates (provide disk number) $15.00

D.P. Johnson Software SDISK or SDISK3 $29.95 L1+L2 Utils $75.00
Shipping and handlling — any software $2.00

Orders must be prepaid or COD. VISA/MC accepted. COD is additional.

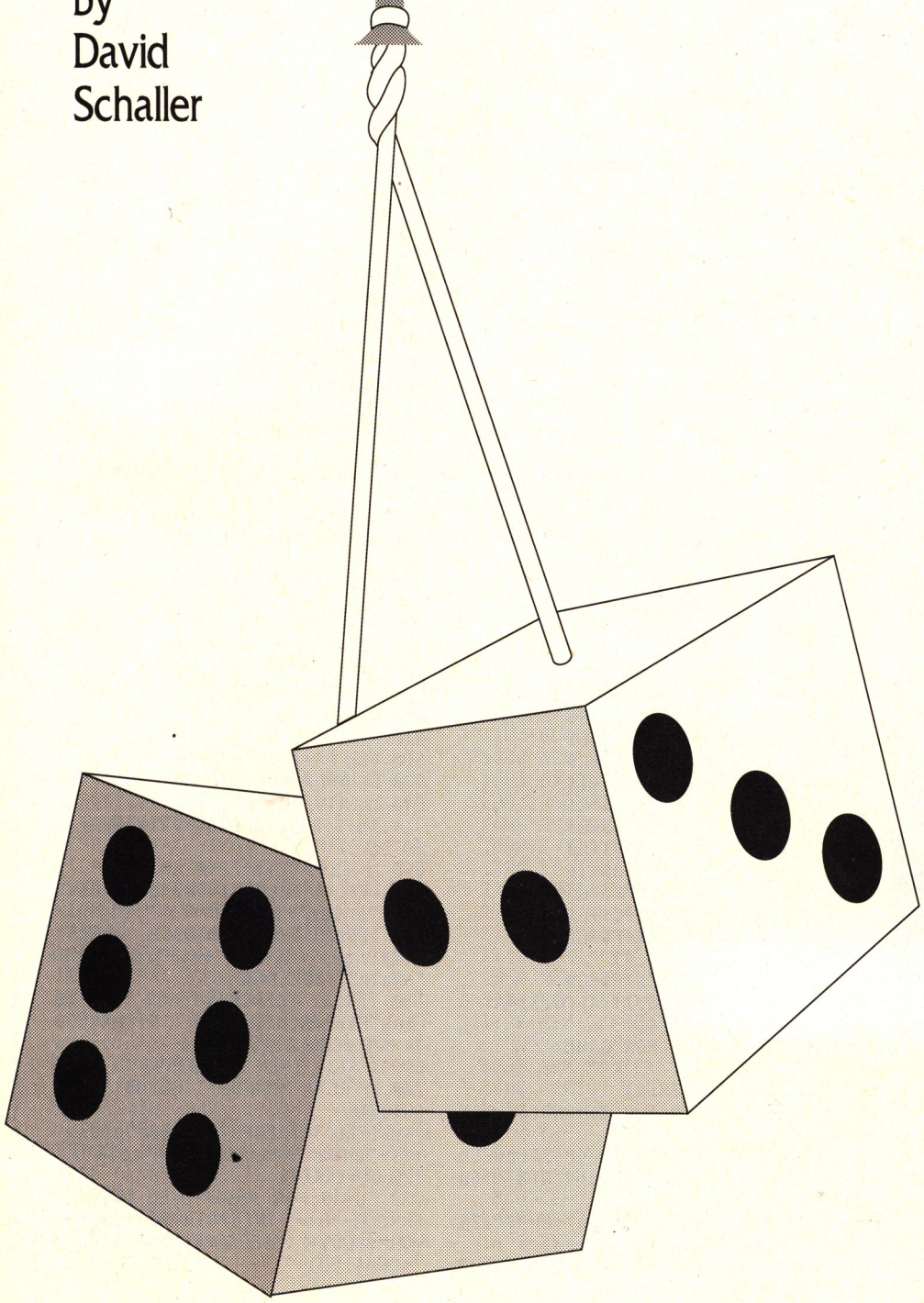
571 Center Road, Hillsboro, NH 03244 USA
(603) 464-3850

OS-9 is a trademark of Microware Systems Corporation and Motorola, Inc.
MS-DOS is a trademark of Microsoft Corp. FLEX is a ttrademark of TSC, Inc.

```
=3THENDY=DX
366 IFPEEK(&H102A)=0THENHGET(544
,96)-(543+DX,95+DY),5:HSCREEN0:E
XEC&HF00:GOTO128ELSEHGET(640-DX,
96)-(639,95+DY),5:HSCREEN0:EXEC&
HF00:GOTO128
368 IF K>1THEN372
370 GOSUB322:K=ASC(K$):IFK>96 AN
D K<116THENK=K-97:GOTO362ELSESOU
ND60,9:GOTO370
372 GOSUB322:K=ASC(K$):IFK>96 AN
D K<107THENK=K-97:GOTO362ELSESOU
ND60,9:GOTO372
374 GOSUB322:K=ASC(K$):IFK=8THEN
378ELSEIFK=10THEN380ELSEIFK=94TH
EN382
376 K$=INKEY$:IFL+4<W AND K$=""T
HENHPUT(L,T)-(L+1,T+D),1:L=L+4:H
GET(L,T)-(L+1,T+D),1:HLINE(L,T)-
(L+1,T+D),PSET,BF:GOTO376ELSERET
URN
378 K$=INKEY$:IFL-4>U AND K$=""T
HENHPUT(L,T)-(L+1,T+D),1:L=L-4:H
GET(L,T)-(L+1,T+D),1:HLINE(L,T)-
(L+1,T+D),PSET,BF:GOTO378ELSERET
URN
380 K$=INKEY$:IFT+D<191 AND K$="
"THENHPUT(L,T)-(L+1,T+D),1:T=T+D
+1:HGET(L,T)-(L+1,T+D),1:HLINE(L
,T)-(L+1,T+D),PSET,BF:GOTO380ELS
ERETURN
382 K$=INKEY$:IFT-D>0 AND K$=""T
HENHPUT(L,T)-(L+1,T+D),1:T=T-D-1
:HGET(L,T)-(L+1,T+D),1:HLINE(L,T
)-(L+1,T+D),PSET,BF:GOTO382ELSER
ETURN
384 IFHK=0THENRETURN
386 F$=F$+CHR$(HS)+RIGHT$(STR$(H
F),1):HR=HR+1:HF=HF+1:IFHR=5THEN
HF=1:IFHK=1THENHK=0:CC=0:RETURNE
LSEIFHK=2THENHS=82:U=8:W=336:GOS
UB516ELSEHS=77:U=16:W=248:GOSUB5
16
388 IFHR=9THENHF=1:IFHK=2THENHK=
0:CC=0:RETURNELSEHS=82:U=0:W=232
:GOSUB516
390 IFHR=13THENHK=0:CC=0:RETURN
392 V=0:L=U:T=V:GOTO250
394 CLS:LOCATE10,10:PRINT"ARE YO
U SURE? (Y/N) ":GOTO322
396 GOSUB322:IFK$<"1" OR K$>"3"T
HENSOUND60,8:GOTO128ELSEHF=1:HR=
1:HS=76:IFK$="1"THENHK=1:U=0:W=6
40ELSEIFK$="2"THENHK=2:U=64:W=39
2ELSEHK=3:U=32:W=264
398 GOSUB516:GOSUB392:HF=1:GOTO1
28
400 CLS:LOCATE11,8:PRINT"TOP MAR
GIN =";V:LOCATE11,9:PRINT"LEFT M
ARGIN =";U:LOCATE11,10:PRINT"RIG
HT MARGIN =";W:LOCATE11,11:PRINT
"BOTTOM MARGIN =";P+D:LOCATE11,1
2:PRINT"TAB1 =";T1:LOCATE11,13:P
RINT"TAB2 =";T2
402 GOTO320
404 GOSUB212:CLS:LOCATE12,8:PRIN
T"FILENAME: ";:LINEINPUTF$:Z$=RI
GHT$(F$,2):Z1$=Z$:IFASC(Z$)=58TH
ENDRIVEVAL(RIGHT$(Z$,1)):F$=LEFT
$(F$,LEN(F$)-2)ELSEZ$=":0"
406 IFHK=0 OR I1=1THENRETURNELSE
HL=LEN(F$)+2:IFHL>8THENF$=LEFT$(
F$,6):HL=8
408 CC=1:FORI=1TOHL:POKEPF-1+I,A
SC(MID$(F$+Z$,I,1)):NEXT:RETURN
410 LOCATE15,4:ATTR3,2,U:PRINT"U
ltraLace";:ATTR2,2:LOCATE8,6:PRI
NT"THE ULTIMATE SHOESTRING":LOCA
TE11,8:PRINT"DESKTOP PUBLISHER":
ATTR3,2:LOCATE11,12:PRINT"BY H.
Allen Curtis":LOCATE13,14:PRINT"
COPYRIGHT 1990":LOCATE16,4:ATTR3
,2:RETURN
412 CLS:ATTR0,4:OPEN"I",#1,"STR"
:FORI=1TO6:LINEINPUT#1,AC$:LOCAT
E4,7+I:PRINTAC$:NEXT
414 GOSUB212:K$=INKEY$:IFK$=""TH
EN414ELSEIFK$>"6" OR K$<"1"THENS
OUND60,5:GOTO414
416 SK=VAL(K$):KS=1
418 FORI=1TOSK:LINEINPUT#1,AC$:N
EXT:CLOSE#1:RETURN
420 POKE&H23,A1:POKE&H24,A2:IFKS
<=LEN(AC$)THENK$=MID$(AC$,KS,1):
KS=KS+1:GOSUB422:GOTO62ELSESCI=0
:HPUT(L,T)-(L+1,T+D),1:U=UT:GOTO
50
422 IFASC(K$)=94THENK$=CHR$(13):
RETURNELSERETURN
424 V=192-(D+1)*INT(192/(D+1)):T
=V:RETURN
426 IFH=1THENU=4*INT(.25*L):RETU
RNELSEU=8*INT(.125*L):RETURN
428 POKE&HFFD8,0:IFEOF(1)=-1THEN
CLOSE#1:POKE&HFFD9,0:SCI=0:HPUT(
L,T)-(L+1,T+D),1:U=UT:GOTO50ELSE
GOSUB214:LINEINPUT#1,SK$:POKE&HF
FD9,0
430 IFSK=0THENSCI=0:U=UT:GOTO450
432 POKE&H23,A1:POKE&H24,A2:IFKS
<=LEN(SK$)THENK$=MID$(SK$,KS,1)E
LSE446
434 IFASC(K$)=91THENK$=CHR$(13):
RS=1
436 IFASC(K$)=94THENKS=KS+2:IFKS
>LEN(SK$)THENKS=1:GOTO428ELSE432
438 IFL=U AND K$=" "THENSZ=1ELSE
IFL=U+S AND K$<>" " AND SZ=1THEN
HPUT(L,T)-(L+1,T+D),1:L=U:SZ=0EL
SESZ=0:IFL>U AND KS=1 AND K$=" "
THENHPUT(L,T)-(L+1,T+D),1:L=U:IF
T<P AND T<191-2*D THENT=T+1+D EL
SESK=0:GOTO430
440 KS=KS+1:GOTO62
442 IFH=1THENU=4*INT(.25*L):RETU
RNELSEU=8*INT(.125*L):RETURN
444 IFSCI<>2THEN124ELSESK=0:GOTO
430
446 IFSK$=""THENHPUT(L,T)-(L+1,T
+D),1:L=U ELSEKS=1:IFRS=1THENRS=
0:GOTO428ELSEIFL+S+8>W THEN488EL
SEK$=" ":GOTO62
448 IFT<P AND T<191-2*D THENT=T+
1+D:GOTO62ELSESK=0:GOTO430
450 T=V:HSCREEN0:CLS:ATTR0,4
452 LOCATE4,8:PRINT"Do you want
to save on disk the rest
of the ASCII strings of":LOCATE
13,10::PRINTFA$;":";ZA$:LOCATE4,
11:PRINT"for later translation t
o their font images? (Y
/N) ";
454 K$=INKEY$:IFK$=""THEN454
456 IFK$="N" OR K$="n"THENCLOSE#
1:GOTO168
458 IFK$="Y" OR K$="y"THENLOCATE
4,14:PRINT"The rest of the strin
gs will be saved in REST
:";ZA$;
460 IFFA$="REST"THENRE$="TEMP"EL
SERE$="REST
462 POKE&HFFD8,0:OPEN"O",#2,RE$+
":"+ZA$
464 GOSUB476:IFKS>=LEN(SK$)THEN4
68
466 PRINT#2,RIGHT$(SK$,LEN(SK$)-
KS)
468 IFEOF(1)=-1THENCLOSE#1:CLOSE
#2:GOTO472
470 GOSUB214:LINEINPUT#1,SK$:PRI
NT#2,SK$:GOTO468
472 IFRE$="TEMP"THENKILL"REST/DA
T:"+ZA$:RENAME"TEMP/DAT:"+ZA$ TO
"REST/DAT:"+ZA$
474 GOTO168
476 KS=KS-1:IFKS=0THENRETURNELSE
IFMID$(SK$,KS,1)<>" "THEN476ELSE
RETURN
478 GOSUB212:SK=6:KS=1:SCI=2:CLS
:LOCATE4,8:PRINT"Type filename o
f ASCII file you want tr
anslated: ";:LINEINPUTFA$:Z$=RI
GHT$(FA$,2):ZA$="0":IFASC(Z$)=58
THENZA$=RIGHT$(Z$,1):FA$=LEFT$(F
A$,LEN(FA$)-2)
480 POKE&HFFD8,0:OPEN"I",#1,FA$+
":"+ZA$:RETURN
482 GOSUB212:CLS:LOCATE11,9:PRIN
T"1: FULL SCREEN FILE":LOCATE11,
10:PRINT"2: HALF SCREEN FILE":LO
CATE11,11:PRINT"3: WORD PROCESSO
R FILE":LOCATE11,12:PRINT"4: ASC
II STRINGS
484 GOSUB322:IFK$="1"THENI1=1:GO
SUB30:I1=0:GOTO128ELSEIFK$="2"TH
ENI1=1:GOSUB34:I1=0:GOTO128ELSEI
FK$="3"THEN486ELSEIFK$="4"THENSC
I=1:UT=U:GOSUB426:GOSUB412:GOTO1
68ELSESOUND60,5:GOTO128
486 UT=U:GOSUB478:GOTO168
488 HPUT(L,T)-(L+1,T+D),1:L=U:IF
T<P AND T<191-2*D THENT=T+D+1:GO
TO428ELSESK$="":GOTO448
490 CLOSE#1:FORI=0TO2000:NEXT:GO
TO128
492 IFERLIN=472THEN474
494 IFERLIN=40THEN48
496 IFERLIN=328THENSOUND60,9:GOS
UB328:GOTO128
498 IFERLIN=98THENT1=T:FORI=1TOS
F:HPUT(U,T)-(W-1,T+INT(D/SF)),4:
T=T+INT(D/SF):NEXT:T=T1:L=U:GOTO
50
500 IFERLIN=470 AND ERNO=23 THEN
CLOSE#1:CLOSE#2:GOTO472
502 IFERLIN=30 OR ERLIN=34 OR ER
LIN=480THEN504ELSE506
504 SCI=0:SOUND60,5:LOCATE5,11:P
RINT"THERE IS NO FILE BY THAT NA
ME":LOCATE7,13:PRINT"ON THE DISK
 IN DRIVE ";:IFZ$=""THENPRINT"0"
:GOTO490ELSEIFASC(Z$)=58THENPRIN
TRIGHT$(Z$,1):GOTO490ELSEPRINT"0
":GOTO490
506 IFERLIN=26THENKILLF$+"/HR1":
KILLF$+"/HR2":RENAME"OUT1/BIN"TO
F$+"/HR1":RENAME"OUT2/BIN"TOF$+"
/HR2":DRIVE0:GOTO128
508 IFERLIN=28THENKILLF$+"/HR":R
ENAME"OUT/BIN"TOF$+"/HR":DRIVE0:
GOTO128
510 IFERLIN=14THENWIDTH32:CLS:PR
INT"";:WIDTH40:CLS3:LOCATE1,8:PR
INT"INSERT ULT DISK IN DRIVE 0 &
 HIT SPACE";:GOSUB322:POKE&H13FF
,9:GOSUB14:GOTO128
512 IFERLIN=180THENCLOSE#1:K$="F
":SOUND60,9:EXEC&HF8E:GOTO138
514 GOTO334
516 IFH=1THENU=.5*U:W=.5*W:RETUR
NELSERETURN
```

Superdice

by
David
Schaller



Welcome to *Superdice*, a takeoff on a very popular dice game. If you're tired of blasting alien spacecraft or frying creepy-crawleys squirming across your video screen, then you need this change-of-pace game.

After loading and running SUPRDICE, a title screen appears and prompts you to enter the number of players and their names. The game begins after this.

After the first player rolls the dice, a score table is shown. There are two score tables in *Superdice*. The object of the game is to fill each slot in the tables with as many points as possible. You can use the up and down arrows to move the marker on the right of the screen, thereby selecting the slot in which you want to score.

The first table has six slots in which you can score. If you choose to score in the first table, simply position the marker and press ENTER. For example, if you roll a 1-2-2-4-5 combination and decide to score in the two's slot, you would receive four points — two points for each 2. The game works in much the same way for the remainder of the slots in the first table. Once you mark in a slot, you cannot mark in

---

David Schaller is a junior at Immanuel Lutheran High School. His noncomputer hobbies include baseball and classical music. You may contact him by writing to N. 4724 Wall, Spokane, WA 99205. Please include an SASE when requesting a reply.

the same slot again. This is also true for the second table.

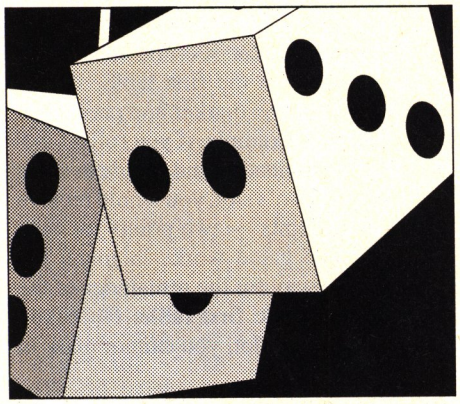
The second score table includes the three and four of a kind, small and large straights, Superdice, and Chance options. If you roll three or four dice of the same number, score it in the appropriate slot and you are given the points of all five dice added together. The small straight is four numbers in sequence and a large straight is five numbers in sequence. If you score in either of these two slots, you receive 30 or 40 points, respectively. A Superdice is five of the same number and is worth 50 points. If you score an additional Superdice, you may mark it again in this slot for another 100 points. The Chance option scores the total of all five dice no matter what they are.

The second table also includes the Roll Again option. You get three rolls of the dice before you must make a score on one of the tables. When you choose the Roll Again option, you are asked which dice you want to roll again. Respond by entering the appropriate numbers. At the upper left of the score tables are the letters TT, GT and DT followed by a number. TT (This Table) gives you the total points on a specific table. GT is your grand total and DT is the total of the five dice.

If you enter a score in a slot and your dice and category don't match, -1 is placed in the slot and you can't use it again.

At the "Press Enter to Roll" prompt, press S to display a list of the current scores in order from highest to lowest.

If you make a mistake, press N to get out of it. For example, if you enter the wrong numbers to reroll and realize it after pressing ENTER, pressing N cancels the move.

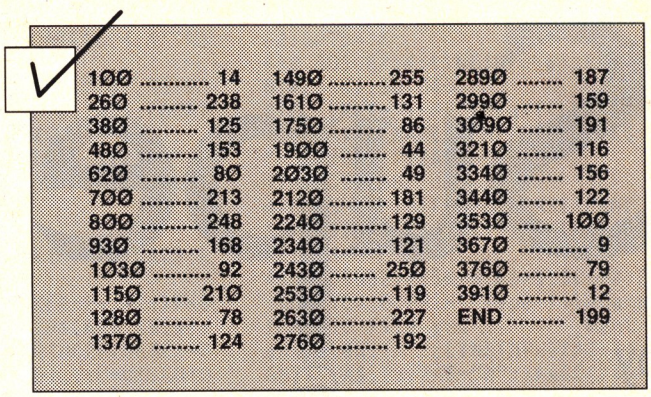


The game is over when all score tables have been completed, and the final scores are displayed. If you score 60 or above on the first table, you receive bonus points.

If you want to use the speed-up poke, you may add it anywhere before Line 70. However, I really don't think it is necessary, for game play is reasonable.

I hope I have succeeded in making this game easy and enjoyable. Have fun! ❑

32K Extended



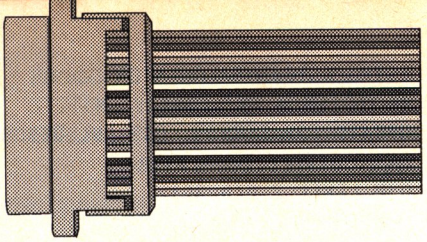
100	14	1490	255	2890	187
260	238	1610	131	2990	159
380	125	1750	86	3090	191
480	153	1900	44	3210	116
620	80	2030	49	3340	156
700	213	2120	181	3440	122
800	248	2240	129	3530	100
930	168	2340	121	3670	9
1030	92	2430	250	3760	79
1150	210	2530	119	3910	12
1280	78	2630	227	END	199
1370	124	2760	192		

The Listing: SUPRDICE

```
1 'SUPERDICE
2 'BY DAVID SCHALLER
3 'COPYRIGHT (C) JULY 1991
4 'BY FALSOFT, INC.
5 'RAINBOW MAGAZINE
10 REM *************************
20 REM *        SUPERDICE        *
30 REM *       VERSION 4.0       *
40 REM *    BY DAVID SCHALLER    *
50 REM *         1/12/91         *
60 REM *************************
70 CLEAR550
80 DIMA$(6,4),S(4,6),U(4,7)
90 C$=CHR$(207):D$=CHR$(205):E$=
CHR$(203)
100 F$=CHR$(206):G$=CHR$(202):H$
=CHR$(204):I$=CHR$(200)
110 Y$=CHR$(128)
120 A$(1,1)=C$+C$+C$+G$
130 A$(1,2)=C$+F$+C$+G$
140 A$(1,3)=A$(1,1)
150 A$(1,4)=H$+H$+H$+I$
160 A$(2,1)=C$+C$+F$+G$
170 A$(2,2)=A$(1,1)
180 A$(2,3)=F$+C$+C$+G$
190 A$(2,4)=H$+H$+H$+I$
200 A$(3,1)=F$+C$+C$+G$
210 A$(3,2)=C$+F$+C$+G$
220 A$(3,3)=C$+C$+F$+G$
230 A$(3,4)=H$+H$+H$+I$
240 A$(4,1)=F$+C$+F$+G$
250 A$(4,2)=C$+C$+C$+G$
260 A$(4,3)=F$+C$+F$+G$
270 A$(4,4)=H$+H$+H$+I$
280 A$(5,1)=F$+C$+F$+G$
290 A$(5,2)=C$+F$+C$+G$
300 A$(5,3)=F$+C$+F$+G$
310 A$(5,4)=A$(4,4)
320 A$(6,1)=F$+C$+F$+G$
330 A$(6,2)=A$(6,1):A$(6,3)=A$(6
,1):A$(6,4)=A$(4,4)
340 REM SET UP FOR GAME
350 CLS4
360 HH=RND(-TIMER)
370 FOR I=1 TO 5:D(I)=RND(6):NEX
T I
380 CO=1:FOR I=34 TO 58 STEP6:DD
=D(CO):L=I:GOSUB1800:PRINT@I+160
,CO;:CO=CO+1:NEXTI
390 PRINT@262,"welcome"+CHR$(128
)+"to"+CHR$(128)+"superdice";
400 PLAY"03V27L26CDEFGAB04C03C02
BAGFEDC"
410 PRINT@295,"COPYRIGHT (C) 199
1";:PRINT@295+32,"BY  DAVID SCHA
LLER";
420 FORZ1=1TO500:NEXTZ1
430 PRINT@388,"HOW MANY PLAYERS?
 (1-4)";:SOUND170,1
440 Q$=INKEY$:IFQ$=""THEN440
450 Q=VAL(Q$):IFQ<1 OR Q>4 THEN4
30
460 SOUND200,1
470 GOSUB1880
480 FOR LP=1 TO Q
490 PRINT@256+LP*32,STRING$(32,3
2);
500 PRINT@256+(LP*32),"PLAYER"+S
TR$(LP)+">";
510 LINEINPUT P$(LP)
520 IFP$(LP)="" THEN500
530 NEXTLP
540 FORLP=1TO300:NEXTLP
550 GOSUB1880
560 T=1
570 'BEGIN PLAY********
580 GOSUB3830
590 IF PU=1 THEN2830
600 RL=1
610 '
620 FOR C4=1 TO5:RR(C4)=1:NEXTC4
630 IF DV(T)=1 THEN1690
640 PRINT@288,"player"+Y$;:POKE1
319,48+T:POKE1320,58:PRINT@297,P
$(T);
650 IF F2=1 THEN F2=0:GOTO710
660 IFRL=1 THENPRINT@358,"press"
+Y$+"enter"+Y$+"to"+Y$+"roll";
670 IFRL>1 THENPRINT@352,"which"
+Y$+"ones"+Y$+"to"+Y$+"roll"+Y$+
"again";:POKE1400,63
680 IFRL>1 THENCO=49:FOR I=34 TO
 58STEP6:PRINT@I+160," "+CHR$(CO
)+" ";:CO=CO+1:NEXT I
690 IFRL>1 THEN GOSUB3590
700 IF RL>1 THEN F2=1:GOSUB1880:
GOTO640
710 IFRL>1 THENPRINT@358,"press"
+Y$+"enter"+Y$+"to"+Y$+"roll";
720 Q$=INKEY$
730 CO=49:FOR I=34 TO 58 STEP6:I
FRR(CO-48)=1 THENPRINT@I+160,">"
+CHR$(CO)+"<";ELSEPRINT@I+160,"
"+CHR$(CO)+" ";
```

```
740 CO=CO+1:NEXT I:BL$=""
750 FOR C5=1 TO LEN(P$(T))
760 BL$=BL$+CHR$(ASC(MID$(P$(T),
C5,1))+32)
770 NEXT C5:C5=0
780 FOR C6=1 TO 12
790 Q$=INKEY$
800 IFQ$=CHR$(13) THENPRINT@297,
BL$;:GOTO870
810 IFQ$="S" THEN2500
820 IFQ$="N" AND RL>1 THEN GOSUB
1880:GOTO640
830 NEXT C6
840 IFC5=0 THENPRINT@297,BL$; EL
SEPRINT@297,P$(T);
850 C5=1-C5
860 GOTO780
870 PRINT@428,"ROLLING";
880 'ROLLING SEQUENCE
890 L=34
900 GOTO2730
910 GOSUB1880
920 REM **** DISPLAY OPTION BOAR
DS ****
930 A1=279
940 FOR C5=266 TO 426 STEP32:PRI
NT@C5,STRING$(13,32);:NEXTC5
950 PRINT@256,STRING$(9,32);:PRI
NT@288,STRING$(9,32);
960 PRINT@320,STRING$(9,32);
970 PRINT@266,"(1'S)=1 :"S(T,1);
980 PRINT@298,"(2'S)=2 :"S(T,2);
990 PRINT@330,"(3'S)=3 :"S(T,3);
1000 PRINT@362,"(4'S)=4 :"S(T,4)
;
1010 PRINT@394,"(5'S)=5 :"S(T,5)
;
1020 PRINT@426,"(6'S)=6 :"S(T,6)
;
1030 PRINT@459,"next"+Y$+Y$+"tab
le";
1040 S1=0:FOR C5=1 TO 6:S1=S1+S(
T,C5):NEXT C5
1050 S2=0:FOR C5=1 TO 7:S2=S2+U(
T,C5):NEXT C5
1060 PRINT@256,"TT:"S1;
1070 PRINT@288,"GT:"S1+S2;
1080 PRINT@320,"DT:"D(1)+D(2)+D(
3)+D(4)+D(5);
1090 PRINT@A1,Y$;:A1=279
1100 PRINT@A1,CHR$(95);
1110 Q$=INKEY$
1120 EXEC44539:Q$=INKEY$
1130 IFQ$=CHR$(13) THENPRINT@A1,
CHR$(127);:GOTO1210
1140 PRINT@A1,Y$;
1150 IFQ$=CHR$(94) THENA1=A1-32
1160 IF Q$="N" THEN1250
1170 IFQ$=CHR$(10) THENA1=A1+32
1180 IF A1<279 THEN A1=471
1190 IF A1>471 THEN A1=279
1200 GOTO1100
1210 SL=A1/32-7:SL=INT(SL)
1220 IF SL=7 THEN1250
1230 IF S(T,SL)<>0 THENPLAY"T255
L25501AAAAAAAAAAAAA":GOTO1100
1240 GOTO1920
1250 'SECOND TABLE*********
1260 GOSUB1880:A1=284
1270 FOR C5=266 TO 458 STEP32:PR
INT@C5,STRING$(18,32);:NEXT C5
1280 PRINT@256,STRING$(9,32);:PR
INT@288,STRING$(9,32);
1290 PRINT@320,STRING$(9,32);
1300 PRINT@266,"3 OF A KIND :";U
(T,1);
1310 PRINT@298,"4 OF A KIND :";U
(T,2);
1320 PRINT@330," FULL HOUSE :";U
(T,3);
1330 PRINT@362,"SM.STRAIGHT :";U
(T,4);
1340 PRINT@394,"LG.STRAIGHT :";U
(T,5);
1350 PRINT@426," SUPERDICE! :";U
(T,6);
1360 PRINT@458,"     CHANCE :";U
(T,7);
1370 IFRL<>3 THENPRINT@493,"roll
"+Y$+"again"; ELSEPRINT@493,"nex
t"+Y$+"table";
1380 PRINT@256,"TT:"S2;
1390 PRINT@288,"GT:"S1+S2;
1400 PRINT@320,"DT:"D(1)+D(2)+D(
3)+D(4)+D(5);
1410 PRINT@A1,Y$;:A1=284
1420 PRINT@A1,CHR$(95);
1430 Q$=INKEY$
1440 EXEC44539:Q$=INKEY$
1450 IF Q$=CHR$(13) THENPRINT@A1
,CHR$(127);:GOTO1530
1460 PRINT@A1,Y$;
1470 IF Q$=CHR$(94) THEN A1=A1-3
2
1480 IF Q$="N" THEN910
1490 IF Q$=CHR$(10) THEN A1=A1+3
2
1500 IF A1<284 THEN A1=508
1510 IF A1>508 THEN A1=284
1520 GOTO1420
1530 SL=A1/32-7:SL=INT(SL)
1540 IF SL=8 THEN1570
1550 IF SL=6 AND U(T,SL)<>-1 THE
N1590
1560 IF U(T,SL)<>0 THENPLAY"O1T2
55L25501AAAAAAAAAAAA":GOTO1420
1570 IF SL=8 AND RL<3 THEN RL=RL
+1:GOSUB1880:GOTO640
1580 IF SL=8 AND RL=3 THENGOSUB1
880:GOTO920
1590 REM ORDER ROLL
1600 FOR C5=1 TO 5
1610 E(C5)=D(C5)
1620 NEXT C5
1630 FOR C5=1 TO 4
1640 IF E(C5)<=E(C5+1) THEN1660
1650 Z=E(C5):E(C5)=E(C5+1):E(C5+
1)=Z:GOTO1630
1660 NEXT C5
1670 ON SL GOSUB2010,2080,2140,2
200,2330,2380,2470
1680 GOSUB1880:RL=1
1690 T=T+1:IF T>Q THEN T=1
1700 IF T=1 THEN570 ELSE600
1710 GOTO1710
1720 REM **********
1730 REM **********
1740 REM **********
1750 REM **********
1760 REM **********
1770 REM SUBROUTINES
1780 REM **********
1790 REM **********
1800 'PRINT DIE AT (L) LOCATION
1810 'DIE TO PRINT IS (DD)
1820 C2=1
1830 FOR K=L TO L+96 STEP32
1840 PRINT@K,A$(DD,C2);
1850 C2=C2+1
1860 NEXTK
1870 RETURN
1880 'CLEAR SCREEN PRINT AREA
1890 FOR LP=256TO448STEP32:PRINT
@LP,STRING$(32,128);
1900 NEXTLP:PRINT@480,STRING$(31
,128);:POKE1535,128
1910 RETURN
1920 REM COUNT AND ADD ONLY(SL)
1930 CX=0
1940 FOR C5=1 TO 5
1950 IF D(C5)=SL THEN CX=CX+SL
1960 NEXT C5
1970 IF CX=0 THEN S(T,SL)=-1:FOR
C6=1TO5:SOUND1,1:NEXTC6 ELSE S(T
,SL)=CX:SOUND205,4
1980 RL=1:GOSUB1880
1990 GOTO1690
2000 GOTO570
2010 '3 OF A KIND
2020 IF E(1)=E(2) AND E(1)=E(3)
THEN2060
2030 IF E(2)=E(3) AND E(2)=E(4)
THEN2060
2040 IF E(3)=E(4) AND E(3)=E(5)
THEN2060
2050 FOR C6=1 TO5:SOUND1,1:NEXTC
6:U(T,SL)=-1:RETURN
2060 U(T,SL)=D(1)+D(2)+D(3)+D(4)
+D(5)
2070 SOUND205,4:RETURN
2080 '4 OF A KIND
2090 IF E(1)=E(2) AND E(1)=E(3)
AND E(1)=E(4) THEN2120
2100 IF E(2)=E(3) AND E(2)=E(4)
AND E(2)=E(5) THEN2120
2110 FOR C6=1 TO5:SOUND1,1:NEXTC
6:U(T,SL)=-1:RETURN
2120 U(T,SL)=D(1)+D(2)+D(3)+D(4)
+D(5)
2130 SOUND205,4:RETURN
2140 'FULL HOUSE
2150 IF E(1)=E(2) AND E(1)=E(3)
AND E(4)=E(5) THEN2180
2160 IF E(1)=E(2) AND E(3)=E(4)
AND E(3)=E(5) THEN2180
2170 FOR C6=1 TO5:SOUND1,1:NEXTC
6:U(T,SL)=-1:RETURN
2180 U(T,SL)=25
2190 SOUND205,4:RETURN
2200 'SM.STRAIGHT
2210 FOR C6=1 TO 6:X3(C6)=0:NEXT
 C6
2220 FOR C6=1 TO 5
2230 FOR C7=1 TO 6
2240 IF E(C6)=C7 THEN X3(C7)=1
2250 NEXTC7
2260 NEXTC6
2270 IF X3(1)=1 AND X3(2)=1 AND
X3(3)=1 AND X3(4)=1 THEN2310
2280 IF X3(2)=1 AND X3(3)=1 AND
X3(4)=1 AND X3(5)=1 THEN2310
2290 IF X3(3)=1 AND X3(4)=1 AND
X3(5)=1 AND X3(6)=1 THEN2310
2300 FOR C6=1TO5:SOUND1,1:NEXTC6
:U(T,SL)=-1:RETURN
2310 U(T,SL)=30
2320 SOUND205,4:RETURN
2330 'LG.STRAIGHT
2340 IF E(5)-1=E(4) AND E(4)-1=E
(3) AND E(3)-1=E(2) AND E(2)-1=E
(1) THEN2360
2350 FOR C6=1 TO5:SOUND1,1:NEXTC
6:U(T,SL)=-1:RETURN
2360 U(T,SL)=40
2370 SOUND204,5:RETURN
2380 'SUPERDICE!
2390 IF E(1)=E(2) AND E(1)=E(3)
AND E(1)=E(4) AND E(1)=E(5) THEN
```

```
2410
2400 FOR C6=1 TO5:SOUND1,1:NEXTC
6:U(T,SL)=-1:RETURN
2410 IFU(T,SL)>0 THENU(T,SL)=U(T
,SL)+100 ELSE U(T,SL)=50
2420 PLAY"T3L16V28O4CP16O3GP16O4
CP16O3FP16O4CP16O3"
2430 PLAY"E-DE-DCP16L8O4E-L16DP1
6L4GL8C"
2440 PLAY"O3L16BABAGABG;L16O4CP1
6O3GP16FP16O4DP16L16O3"
2450 PLAY"E-DE-DCP16O4E-FGP16CP1
6O3GP16BP16L2O4C"
2460 RETURN
2470 'CHANCE
2480 U(T,SL)=D(1)+D(2)+D(3)+D(4)
+D(5)
2490 SOUND200,5:RETURN
2500 GOSUB1880:PRINT@288,CHR$(12
3)+"scores"+CHR$(125);
2510 FOR C5=1 TO Q
2520 SX(C5)=S(C5,1)+S(C5,2)+S(C5
,3)+S(C5,4)+S(C5,5)+S(C5,6)+U(C5
,1)
2530 SX(C5)=SX(C5)+U(C5,2)+U(C5,
3)+U(C5,4)+U(C5,5)+U(C5,6)+U(C5,
7)
2540 NEXT C5
2550 FOR C5=1 TO Q:X$(C5)=P$(C5)
:NEXTC5
2560 IF Q=1 THEN2620
2570 FOR C5=1 TO Q-1
2580 IF SX(C5)>=SX(C5+1) THEN261
0
2590 GG$=X$(C5):OE=SX(C5):X$(C5)
=X$(C5+1):SX(C5)=SX(C5+1):X$(C5+
1)=GG$:SX(C5+1)=OE
2600 GOTO2570
2610 NEXT C5
2620 FOR C5=1 TO Q
2630 IF LEN(P$(C5))>10 THEN R6$=
LEFT$(X$(C5),10) ELSE R6$=X$(C5)
+STRING$(10-LEN(X$(C5)),32)
2640 R6$=R6$+":"+STR$(SX(C5))
2650 PRINT@288+(32*C5),STRING$(3
2,32);
2660 PRINT@288+(32*C5),R6$;
2670 NEXTC5
2680 PRINT@452,"press"+Y$+"any"+
Y$+"key"+Y$+"to"+Y$+"continue";
2690 Q$=INKEY$
2700 EXEC44539
2710 GOSUB1880
2720 IF RL>1 THEN F2=1:GOTO640 E
LSE640
2730 G=1:PLAY"V20T255L25501"
2740 IF RR(G)=0 THEN2810
2750 HH=RND(-TIMER)
2760 FOR C5=1 TO RND(10)+2
2770 PLAY"A"
2780 D(G)=RND(6):DD=D(G):GOSUB18
00
2790 '
2800 NEXT C5
2810 SOUND G*10+20,2:L=L+6
2820 G=G+1:IFG=6 THEN910 ELSE274
0
2830 'END OF GAME
2840 CLS0
2850 FOR X=0 TO 15
2860 POKE1024+X,42:POKE1055-X,42
2870 POKE1504+X,42:POKE1535-X,42
2880 POKE1024+(X*32),42:POKE1504
-(X*32),42
2890 POKE1055+(X*32),42:POKE1535
-(X*32),42
2900 NEXTX
2910 PP$="SUPERDICE FINAL STANDI
NGS:":WW=67:GOSUB3310
2920 ZA=1
2930 FOR C5=1 TO Q
2940 IFLEN(P$(C5))>7 THEN X$(C5)
=LEFT$(P$(C5),7) ELSE X$(C5)=P$(
C5)
2950 Z4=S(C5,1)+S(C5,2)+S(C5,3)+
S(C5,4)+S(C5,5)+S(C5,6)
2960 Z5=U(C5,1)+U(C5,2)+U(C5,3)+
U(C5,4)+U(C5,5)+U(C5,6)+U(C5,7)
2970 FS(C5)=Z4+Z5
2980 IF Z4>59 THEN FS(C5)=FS(C5)
+35:BN(C5)=1 ELSE BN(C5)=0
2990 NEXT C5
3000 IF Q=1 THEN3070
3010 FOR C5=1 TO Q-1
3020 IF FS(C5)>=FS(C5+1) THEN306
0
3030 KO=BN(C5):GG$=X$(C5):OE=FS(
C5):X$(C5)=X$(C5+1):FS(C5)=FS(C5
+1)
3040 X$(C5+1)=GG$:FS(C5+1)=OE:BN
(C5)=BN(C5+1):BN(C5+1)=KO
3050 GOTO3010
3060 NEXT C5
3070 FOR LK=129 TO 129+(32*(Q-1)
*2) STEP64
3080 PP$=STRING$(8-LEN(X$(ZA)),1
28)+X$(ZA)+":":WW=LK:GOSUB3310
3090 IF BN(ZA)=1 THEN PP$=STR$(F
S(ZA)-35) ELSE PP$=STR$(FS(ZA))
3100 IF BN(ZA)=0 THENPP$=PP$+" -
NO BONUS"
3110 IF BN(ZA)=1THENPP$=PP$+" ++
+ BONUS"
3120 GOSUB3310
3130 WW=LK+24
3140 PP$="="+STR$(FS(ZA)):GOSUB3
310
3150 ZA=ZA+1
3160 NEXT LK
3170 WW=452:PP$="PRESS (ENTER) T
O CONTINUE":GOSUB3310
3180 'PLAY SONG
3190 READ A8,A9:IF A8=0 THEN3550
3200 SOUND A8,A9
3210 IFPEEK(338)=191 THEN3230
3220 GOTO3190
3230 'PLAY AGAIN
3240 FOR LP=33 TO 449 STEP32:PRI
NT@LP,STRING$(30,128);:NEXTLP
3250 WW=132:PP$="PLAY ANOTHER GA
ME? (Y/N)":GOSUB3310
3260 EXEC44539:MB$=INKEY$
3270 IFMB$<>"Y" AND MB$<>"N"THEN
 3260
3280 IFMB$="N" THEN CLS:END
3290 RUN
3300 GOTO3300
3310 'INVERSE PRINT
3320 FOR O=1 TO LEN(PP$)
3330 A7=ASC(MID$(PP$,O,1))
3340 IF A7>64 AND A7<91 THENPRIN
T@WW,CHR$(A7+32);:GOTO3370
3350 IF A7=32 THENPRINT@WW,CHR$(
128);:GOTO3370
3360 POKE1024+WW,A7
3370 WW=WW+1:NEXT O
3380 RETURN
3390 DATA 176,2,159,2,133,2,133,
2,89,2,133,2
3400 DATA 133,2,159,2,133,2,159,
2,176,2,165,2
3410 DATA 159,2,165,2,147,2,147,
2,89,2,147,2,147,2
3420 DATA 165,2,147,2,165,2,185,
2,176,2,165,2
3430 DATA 159,2,133,2,133,2,89,2
,133,2,133,2,159,2
3440 DATA 133,2,159,2,176,2,165,
2,159,2,165,2,159,2,165,2
3450 DATA 147,2,176,2,165,2,159,
2,133,2,133,2,133,3
3460 DATA 133,1,147,1,159,2,133,
2,133,2
3470 DATA 89,2,133,2,133,2
3480 DATA 159,2,133,2,159,2,159,
2,147,2,133,2
3490 DATA 147,2,125,2,125,2,89,2
3500 DATA 125,2,125,2,147,2,125,
2,147,2,147,2
3510 DATA 133,2,125,2,108,2,133,
2,133,2,89,2,133,2,133,2
3520 DATA 69,2,133,2,133,2,58,2,
133,2,133,2
3530 DATA 165,2,159,2,165,2,147,
2,176,2,165,2,159,2
3540 DATA 133,2,133,2,133,4,0,0
3550 FOR LP=1 TO 400
3560 IFPEEK(338)=191 THEN3230
3570 NEXTLP
3580 RESTORE:GOTO3180
3590 FOR J2=1 TO 5:RR(J2)=0:NEXT
J2
3600 CU(1)=143+64:CU(2)=143+48
3610 J9=384:DC$=""
3620 FOR Z1=1 TO 2
3630 PRINT@J9,CHR$(CU(Z1));
3640 FOR Z2=1 TO 20
3650 J8$=INKEY$:IF J8$<>"" THEN3
680
3660 NEXT Z2,Z1
3670 GOTO3620
3680 IF J8$=CHR$(8) AND J9=384 T
HEN3650
3690 IFJ8$="N"THENRL=RL-1:GOTO12
50
3700 IF J8$=CHR$(8) THENPRINT@J9
,Y$;:DC$=LEFT$(DC$,LEN(DC$)-1)
3710 IF J8$=CHR$(8) THEN J9=J9-1
:IF J9<384 THEN J9=384:GOTO3630
ELSE3630
3720 IF J8$=CHR$(13) THEN3770
3730 IF J8$>="1" AND J8$<="5" TH
EN3740 ELSE3650
3740 DC$=DC$+J8$:J9=J9+1
3750 IF J9>389 THEN DC$=LEFT$(DC
$,5):J9=389:GOTO3630
3760 POKE1024+J9-1,ASC(J8$):GOTO
3630
3770 FOR J2=1 TO LEN(DC$)
3780 FOR J3=1 TO 5
3790 IF VAL(MID$(DC$,J2,1))=J3 T
HEN RR(J3)=1
3800 NEXT J3
3810 NEXT J2
3820 RETURN
3830 'ALL DONE?
3840 FOR F1=1 TO Q
3850 FOR F3=1 TO 6
3860 IF S(F1,F3)=0 THEN 3920
3870 NEXT F3
3880 FOR F3=1 TO 7
3890 IF U(F1,F3)=0 THEN 3920
3900 NEXT F3
3910 DV(F1)=1
3920 NEXT F1
3930 FOR F4=1 TO Q
3940 IF DV(F4)=1 THEN 3950 ELSE3
970
3950 NEXT F4
3960 PU=1
3970 RETURN
```



A Mixed Bag of Tricks

by Eddie Kuns
OS-9 SIG Database Manager

A couple of days ago, I decided to gather all of the local access numbers to SprintNet and Tymnet for a local CoCo club (the Glenside Color Computer Club). I called the respective 800 numbers (800-336-0149 for Tymnet, and 800-336-0437 for SprintNet) to ask how I could get this information. If all you need is the phone number for the nearest node, you can find this information by dialing one of these numbers — you don't even have to talk to a person! However, if you need more information and don't want to wait for the mail, you can dial into a SprintNet or Tymnet node and get the information directly from the node.

For Tymnet, at the "please log in:" prompt, enter INFORMATION. Select menu Option 1, Dial Direct & Outdial (R) Worldwide Access. From this menu, select Option 2, Access Numbers for a Specific U.S. or Canada Location, and then enter the two-letter postal abbreviation for your state or province. This lists all Tymnet local access numbers in your state or province. You can also find quite a bit of other useful information in these menus.

You can get the same information from SprintNet in a similar manner. First, dial into your local SprintNet node. At the @ prompt, enter C MAIL. To both the User Name? and Password? prompts, respond PHONES. At the menu, select Option 1, Domestic Asynchronous Dial Service (for international numbers, select Option 2). Now, Option 1 allows you to see all the local access numbers in your state.

To my surprise I found that SprintNet had added a 2400 bps node in my local calling area. I've been dialing into Delphi at 1200 bps for the past couple of years because that's all that was available in my local calling area. You may want to occasionally check these phone number databases if your local access numbers provide a modem slower than the one you have. The above numbers also provide information about 9600-bps and MNP modem availability.

Associate Accounts

If you share, or want to share, your Delphi account with another person, one practical way of doing this is to open an *associate account*. An associate account is a completely separate login ID with a separate password, but it is billed on the original account. There is no initial charge to open an associate account. For several reasons this is the best way to share an account with someone else. People can tell who is speaking when one of you uses the account. It's more secure since each of you can set a separate password. And you can deactivate the associate account at any time without closing the main account. Also, the two accounts can be independently on the Basic plan or the 20/20 Advantage plan. If you use Delphi frequently while the other person rarely uses it, you can put the main account on the 20/20 Advantage plan and leave the associate account on Delphi's Basic plan.

Associate accounts are also useful in a different way. You may decide that you no longer like your Delphi username and want to change it. Unfortunately, Delphi cannot change your username. However, if you open an associate account and stop using your original account, you have indirectly changed your Delphi username. Be aware, though, that each account (the original and the associate) is still charged the monthly fee. For instance, assume your primary account is set up for the Basic plan and you run 20/20 on your associate account. Your primary account is billed for Basic service (whether you use your primary account or not) as well as the 20/20 for your associate account.

CoCo and OS-9 SIG Forum

If you lose the context of forum messages you are reading, you have several options. One useful command is:

```
READ NEW QUOTE 4
```

```
41109 14-APR 19:58 General Information
   RE: DeskTamer (Re: Msg 40982)
   From: TEDJAEGER     To: BOBKEMPER

>Both IPATCH and the enhanced GFX2 are in the databases. For IPATCH check in
>Utilities. Read IPATCH.AR For the enhanced GFX2 check in Patches. Read both
>ENHANCED GFX2 and GFX2 IPATCH Bob K.

Thanks for the info. I will add it to DeskTamer documentation.
   Best,
   Ted Jaeger
```

Figure 1: New Forum Quotes

Eddie Kuns is pursuing a PhD in physics at Rutgers University. He lives in Aurora, Illinois, and works as a programmer and researcher at Fermilab. Eddie is co-manager of the CoCo SIG; his username is EDDIEKUNS.

This command functions similar to READ NEW by displaying new forum messages one at a time. However, it quotes the first four lines of the message each is in reply to. Of course, if a message is not a reply to another message, no quoted lines are shown. If you enter a new forum command, you lose the quote setting. An example of READ NEW QUOTE 4 is shown in Figure 1. From this example you can see the three lines from Message 40982 are prefaced by greater-than signs (>).

Another way to keep track of the conversation is to use the qualifier ft, which is short for *follow thread*. For example, READ NEW FT allows you to read all new forum messages, one at a time, automatically following message threads. A thread is a group of messages related by the same subject, all being replies to the original message in the thread of following messages. You can also use the following command line:

```
READ NEW FT NS
```

to see all new messages, following threads, nonstop. This is useful only if you can speed read or are capturing the flow of information to disk for later perusal.

GETerm Version 2.5 Downloading

Rick Adams (RICKEEE) brought a thread in the CoCo SIG Forum to my attention. Some *GETerm* users have encountered a problem downloading from Delphi using Xmodem or Ymodem. Apparently, Delphi and *GETerm* follow different interpretations of the standard for these protocols. When the transfer is finished, Delphi waits for a final ACK, which *GETerm* never sends.

Many people work around this problem by typing three CTRL-Cs when the download has finished. RICKEEE suggested pressing CTRL-F instead, since CTRL-F is Character 6, which is ACK. This sends the final ACK Delphi expects and properly terminates the download — at least as far as Delphi is concerned.

Database Information

A bevy of useful programs, utilities and applications were uploaded in February. **Rick Adams** (RICKADAMS) released Version 2.0 of *UUCP* for the CoCo 3 based on *HoneyDanBer UUCP*. *UUCP* allows you to connect your CoCo to a worldwide network of computers via a normal telephone line and modem. You poll, or dial into other computers to transfer electronic mail and USENet news. (USENet news is a lot like Delphi's Forum, except the different topics are more independent.) This is a tremendous achievement for the OS-9 world! At least one other version of *UUCP*, by **Mark Griffith**, exists for the CoCo 3, but it hasn't yet been posted to Delphi. It's based on a different flavor of *UUCP*.

For thuh more fun among you, fer shure, ***Brian Paquette*** *has uploaded a valley speak converter which takes otherwise normal text and churns it into, like, wow, well, fer shure, valley speak! Oh, wow!* These two sentences have been run though this awesome filter. (Well, it started out as two sentences. Don't blame me!)

Philip Brown contributed a miniature lint program that matches braces, and removes linefeeds and TABs from the source. This can be really useful when porting code from another operating system if the source contains tabs.

Some people have had trouble booting OS-9 because certain disk drivers occasionally put themselves to sleep in the system state, which puts the operating system to sleep! (Who will watch the watchman?) Although most, if not all, drivers with this problem have been fixed, **John Wesson** posted a patch to os9p2 to ensure the operating system never puts itself to sleep.

Ken Scales released Version 4.7 of his popular SCSI hard-disk driver. This version contains many new features and enhancements over the previous version, including support for physical formatting.

In the 68K-OS9 database, there was a steady flow of information from **Frank Hogg** and **Delmar** about their new OSK computers.

In the CoCo SIG, **Joe Sannucci** uploaded a file listing many of the IBM ANSI escape sequences. **Don Joyce** released a new version of patches to the DISKTEST program, which is available on Delphi in the RAINBOW ON TAPE area. **Fred McDonald**'s HYPRSTAT.BAS shows the drives currently accessible via *Hyper I/O* for Burke & Burke hard drive owners. Rick Adams posted *DelphiTerm Version 3.2*. This release should help those who have unreliable operation using the bit-banger at 2400 bps and also saves ARC files in the correct format. Experimental DTERM.BIN is a later release to help those who are still having trouble using the bit-banger at 2400 bps. ❑

Database Report

OS-9 SIG

General Information

THE FAMOUS HACKERS' SCHOOL	
BOYNGER	David Boynton

Applications

VALSPEAK SAMPLE OUTPUT	
EARTHER	Shawn Driscoll
RICK ADAMS' UUCP 2.0	
RICKADAMS	Rick Adams
ASTROLOGICAL CALCULATOR	
PROTOTYPER	Brian Snook
UPDATE FOR SIGMON: OS9 LVL DEBUG	
DKINDBERG	Darren Kindberg
OS9 LEVEL 2 DEBUGGER	
DKINDBERG	Darren Kindberg

Utilities

DED_PLUS IPATCH	
MARLOU	Marie-Louis Marcoux
BASIC09 FREE COMMAND	
JSUTEMEIER	Jim Sutemeier
VALLEY GIRL CONVERTER	
BRIANPAQ	Brian Paquette
BRACE MATCHER/INDENTER V1.01	
THEFERRET	Philip Brown
WINDOW SPY	
DRIFTY	Richard Gonzales
SET WINDOW PARAMS FROM B09	
MDALENE	Mike Dalene
DLIST - LIST FILENAMES	
STEPHENC	Stephen Castello

Patches

OSTERM PORT PATCHES	
DOCBEAR	John Wesson
FIX OS9 F$SLEEP BUG	
DOCBEAR	John Wesson
DSPAT: DYNASTAR SUPPORT PATCHES	
KSCALES	Ken Scales
CCHDSCSI V4.7 SCSI DRIVER	
KSCALES	Ken Scales

Telcom

COCO BBS LISTING VER5	
FINDER	John Reece

Graphics & Music

FASTER FRACTALS FOR OS-9	
EARTHER	Shawn Driscoll
BETTER SEASHORE FRACTALS	
BRIANPAQ	Brian Paquette
STRANDED AND OUT OF GAS! (GAME)	
EARTHER	Shawn Driscoll
ORIOLE.VEF	
HOWARDC	Howard Rouse
FISH TALK	
BOBKEMPER	Robert Kemper

Programmers Den

STAT() FSTAT() SOURCE	
WUESTM	Mark Wuest
CPR - C SOURCE PRINTER	
STEPHENC	Stephen Castello
ANSIGET.AR	
MDALENE	Mike Dalene
ANSIDRIVE.AR	
MDALENE	Mike Dalene

68K-OS9

TOMCAT #3 STATUS REPORT	
FHOGG	Frank Hogg
TOMCAT STATUS REPORT #2	
FHOGG	Frank Hogg
TOMCAT STATUS REPORTS	

FHOGG Frank Hogg
SYSTEM IV COMPUTER INFO
EDELMAR Ed Gresick

CoCo SIG

General Information

ANSI CODE INFO
SANNUCCI Joe Sannucci

CoCo 3 Graphics

ARGENT PAINTING
TOMTHOMAS Tom Thomas
GIF PICTURE OF A PORSCHE
TOMTHOMAS Tom Thomas
GIF PICTURE OF BENGEL TIGER
TOMTHOMAS Tom Thomas
IMAGE MASTER V3.0
SANNUCCI Joe Sannucci
STONE FACE PICTURE
TOMTHOMAS Tom Thomas
CRISTI.IMG
TRAS Richard P. Trasborg
FOUR MORE LUSCIOUS IMGS
STEVEPDX Steve Ricketts
LYN.IMG
TRAS Richard P. Trasborg
MORE NUDE 4096 .IMG
STEVEPDX Steve Ricketts
VARIOUS 16-LEVEL DS69B SCANS
STEVEPDX Steve Ricketts
KISS2
TRAS Richard P. Trasborg

Utilities & Applications

MARQUEE-TITLE SCREEN MAKER
HOUSES Rick House
DTEST MOD UPGRADE
REDCOAT Don Joyce
OCILLIS.BAS
DAVPELLERITODave Pellerito
HYPRSTAT/BAS
FREDMCD Fred McDonald

Music & Sound

CLAIRE DE LUNE
ROBWALA Bob Walasek
FIDDLER ON THE ROOF
ROBWALA Bob Walasek

Product Reviews & Announcement

EVERSOFT CATALOG (SPRING 91)
JEMGE Jude Emge
ANOTHER REVIEW OF THE TANDY WP-2
SAMPLE Ernest L. Sample, Jr.

Telecommunications

EXPERIMENTAL DTERM.BIN
RICKADAMS Rick Adams
DELPHITERM VERSION 3.2
RICKADAMS Rick Adams

One For Me

Here at MusicWare, we're prepared to show that our products really perform as advertised, so we're proud to announce a new audio tape! Recorded almost entirely with the aid of CoCo MIDI Pro, ***One For Me*** is a fabulous example of what a professional can do with the program. Catchy tunes, foot stomping rhythms, and a pleasant variety from slow blues to reggae and latin rhythms are all here. This is a tape that you'll want to listen to over and over again! Order now while the price is only $7.95

CoCo MIDI Pro is a complete 16 track MIDI recording sequencer and hardware MIDI interface that gives you all the recording and editing features you need to make great music. 512K CoCo 3, Multi-Pak/Y-cable required. . $125.00

Lyra is an easy to use music editor that lets you compose music on a graphics music staff with a mouse. Includes the 100 page Lyra Companion. $35.00

Ordering information: payment by check, money order, or credit card (Visa or Mastercard) is welcome. Please add $3.00 for shipping on all orders.

MusicWare Hamlet Rt. 1261, Seaside, OR 97138
1-800-321-1490 (orders only, *please!)*
1-503-738-0119 (inquiries)

SUMMER SIZZLER SALE

We've put our most popular groups on sale to help you beat the summer heat. Sale ends August 31, 1991.

NEW NEW NEW NEW NEW NEW

Deception Path: Slide tiles into the maze, changing pathways in an attempt to reach your goal before your opponents do. Fun for all ages. 1-4 players. $19.95

Soviet Bloc: Falling shapes drop down your screen as you struggle to fit them together to form solid rows of blocks. Great joystick/keyboard response. $19.95

Each program plays on a 128K CoCo3. Disk required. Joystick required for Deception Path.

Save $10.00! Buy both for only $30.00!

SOLITAIRE CARD GAMES

Classic Solitaire: Three games in one. Klondike, Canfield and Pyramid on one disk for just $14.95

La Belle Lucie: Very addicting. Once played, this solitaire quickly becomes a favorite. $14.95

All play on 128K CoCo3, with joystick and disk.

Solitaire Special: Both disks for just $25.00!

Tazman (requires OS9/LII and 512K) $24.95
Zenix (CoCo3 128K Disk) $29.95
Crystal City (CoCo3 128K Disk) $34.95
Armchair Admiral (CoCo3 128K Disk) $14.95
Riddle of the Ring (CoCo3/CoCo2 128K Disk) $10.00
Games Pack (CoCo3/CoCo2 128K Disk) $10.00

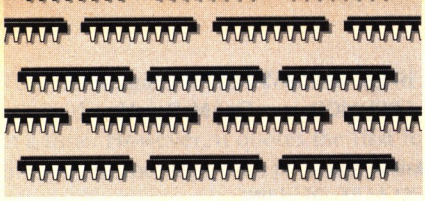
Software submissions invited

Checks, Money Orders, MasterCard & Visa $2.50 S&H
COD $2.00 extra. WA addresses add 8.2% sales tax.

Eversoft Games, Ltd
P.O. Box 3354
Arlington, WA 98223

(206) 653-5263
10am - 6pm PST

30 day money back guarantee



Turn of the Screw

A Slice of Time

by Tony DiStefano
Contributing Editor

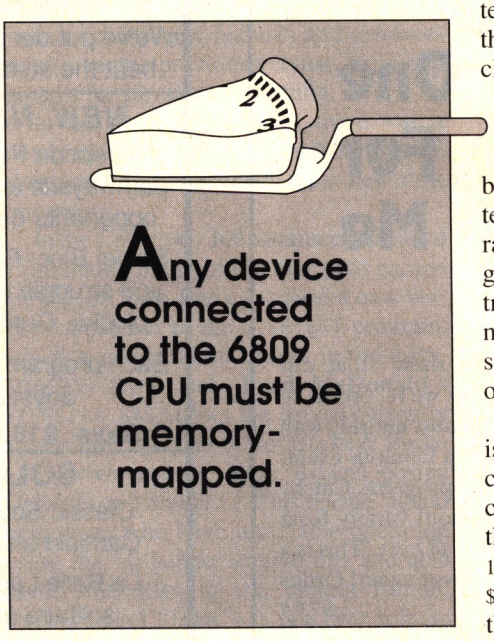
I described in detail the operation of the MSM6242 clock chip last month. This time, we'll see how to connect this RTC (real-time-clock) device to your CoCo. The circuit involved can be connected either directly to the CoCo bus (via the connector inside the Disto Super Controller I or II) or, for the very brave who know their CoCos inside out, inside the computer using some internal I/O area that you must tap. More on that later. For now let's look at what it takes to get started.

Figure 1 shows the wiring diagram for connecting the RTC into what is known as the MEB area. The MEB area is available to anyone who has a Disto Super Controller (I or II) or a Disto MEB Adapter. In other words, if you plan to construct this project as shown in Figure 1, you must have one of the above-mentioned products. The pinouts given in Figure 1 are for the MEB connector — they do not correspond to the CoCo cartridge port, so be careful.

Plotting New Maps

Any device connected to the 6809 CPU must be memory-mapped. And memory mapping requires one or more logic gates. In the case of the MSM6242, three chips are required. The first, U1, is a 74138 used to decode the first three address lines of the MEB area and to separate the R/W line from the CPU into two different lines.

The MEB memory area is from $FF50 to $FF57 (65360 to 65367, decimal). These eight address locations are in the *SCS area of the CoCo's internal I/O map. This area is further decoded by whatever MEB device you are using. Look again at U1. The main select (G2B on Pin 4) comes from the MEB select line (Pin 13). When Address Line A2, connected to G2A on Pin 4, is Low, the decoded area is limited to $FF50 through $FF53. When A2 is High, U1 is disabled, which allows other devices on the MEB bus to use the remaining four addresses ($FF54 through $FF57). The A, B and C inputs are connected to R/W, A0 and A1, respectively. This gives us four alternating "read and write" lines — Y1, Y3, Y5 and Y7 for read, and Y0, Y2, Y4 and Y6 for write.



The second chip we'll use to decode the MSM6242 is a 7404. Gate U2A inverts the Y2 line from U1 as required for the ALE (Address Latch Enable) signal of the clock chip. We'll take a closer look at this a little later.

The third decoding chip, U3, is used in a very interesting manner. This 74157 is used to gate any incoming signal with the E clock of the CPU. As you may well know, the E clock is the main signal in the CoCo that tells all devices exactly when the signals on the address and data buses are valid. The E clock goes active after the address is placed on the address bus and after data is placed on the data bus during writes. This allows the address and data lines to be stabilized before the data is read or written. The 74157 lets us have up to four separate signals gated with the E clock. This is good when you're cramming for space or trying to keep the parts count low. I originally used a 74138, which can handle three separate signals. But there is a catch: only one signal can be used at a time.

What have we done so far? Y0 (from U1) is a write-only signal mapped at $FF50. Y0 connects through U3 to be gated with the E clock, and the output, 1Y (U3, Pin 4), goes to the write-enable line of the RTC. Y1 (U1, Pin 14) is a read-only signal also mapped at $FF50. It goes directly to the read enable of the RTC. You might wonder why it is not going through U3 to be gated with the E clock. Well, there is always more than one way to skin a cat. In this case, I decided to be a little sneaky. The RTC has a relatively slow access time. When any signal is gated with the E clock, it shortens the access time of the signal. Were we to run the CoCo in the 2-MHz mode and gate the read line with the E clock, the MSM6242 would be too slow. By not using the E clock, I gained enough time to make the RTC fast enough. This trick works because the timing for reading data with the 68B09E is not as important as when writing data.

Y2 (U1, Pin 13) is a write-only signal mapped at $FF51. It runs through an inverter

---

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec. Tony's username on Delphi is DISTO.

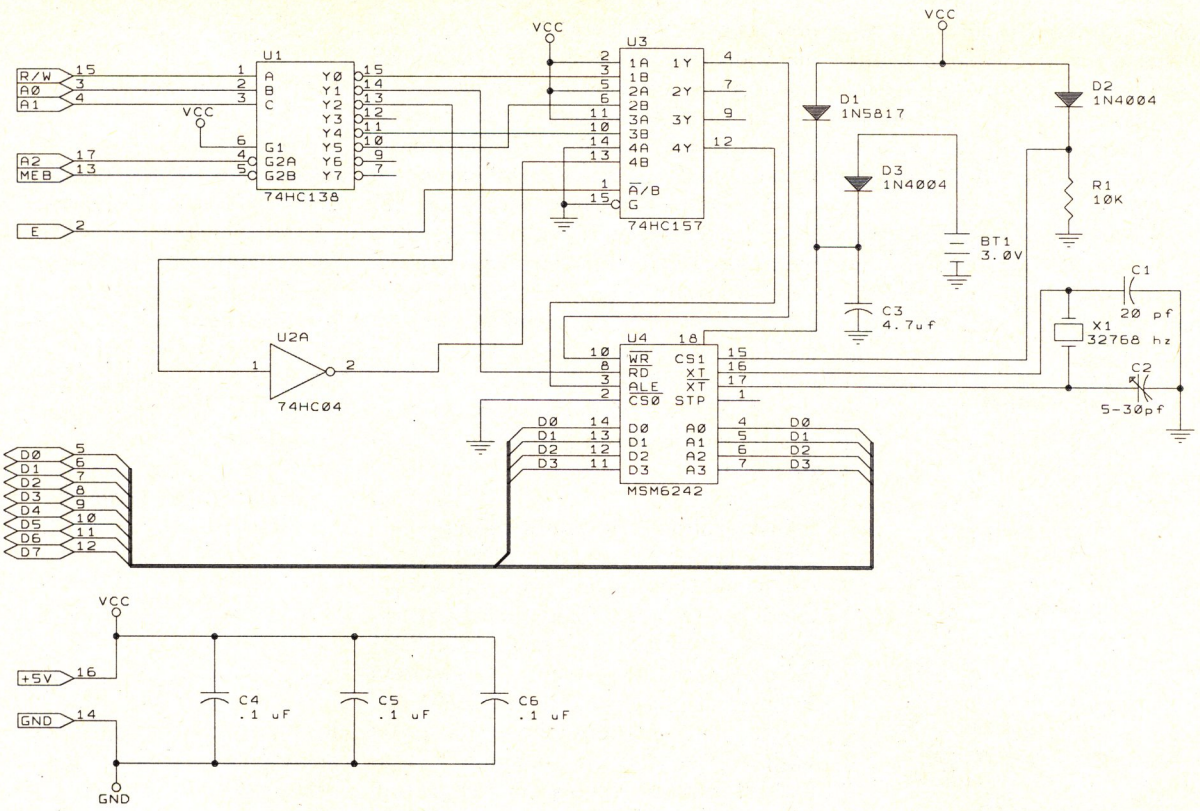


Figure 1

Never Forget!

Ever wish that your computer could display your schedule for the day on start up? Ever wanted some utilities to perform repetitive maintenance tasks on Gcal data files? Or, perhaps you needed to print Gcal calendar data, and couldn't. MV Systems' OS-9 Calendar Utilities will handle all of these tasks and more! These utilities make excellent companions to the Gcal program supplied with Multi-Vue. Or they may be used independently to perform many handy scheduling tasks for you. *Requires Tandy Color Computer 3 w/128k, disk drive, and OS-9 Level 2. Multi-Vue Recommended.*

$14.95

High Finance

Perform a wide variety of financial analysis calculations and create schedules of periodic data with this easy to use Multi-Vue application. Intelligent financial decisions are just a point and click away! Includes fantastic on-line tutorials which help you learn to use the program quickly and easily. Includes present/future value, sinking fund, loan amortization, depreciation, and much more! *Requires Tandy Color Computer 3 w/128k (256k/512k/1024k recommended), disk drive, mouse/joystick, and OS-9 Level 2 w/Windint module. Multi-Vue recommended.*

$24.95

Software Developers: MV Systems needs quality OS-9 software to market. If you have written (or are writing) software you would like to market, contact us for details!

* * * * *

Please add $2.50 shipping and handling to all orders.

MV Systems
P.O. Box 818
Arvada, CO 80001
(303) 420-7777

The OS-9 and Multi-Vue specialists!

JWT Enterprises

Attention! MM1 programmers wanted. Many prospective projects already planned. Write for more information.

Optimize Utility Set 1 *NEW!*

Optimize your disks by eliminating fragmented files and compacting your directories for faster file access. Also includes a utility to assess file fragmentation and directory fragmentation as well as excess directory padding.

Optimize Utility Set 1 $29.95 Foreign postage, add $3.00

Nine-Times: Each issue contains: 9 helpful and useful programs to help build your OS-9 library * Instructions, examples, and samples of Basic09 procedures and subroutines to help with your own programs and your understanding of Basic09 * C programs and programming examples * Hints, Help columns, and informative articles to advance your knowledge of OS-9 * Supplied totally of 5.25" disk * Bound manual sent to each new subscriber for help in getting *Nine-Times* up and running, as well as tips on using it with a ram disk or hard disk * All graphic/joystick interface for ease of use.

1-Year Subs, $34.95 Foreign postage, add $8.00

Back Issues: Available for the *May 1989* through *May 1991* issues. Please write for information on Back Issue contents.

Back Issue, ea. $7.00 Foreign postage, add $2.00 ea.

Magazine Source: Due to many inquiries, the source code for the magazine graphic shell is being provided as an informational tool. Included is the actual Basic09 source code and compiled modules on disk, as well as documentation and a printed copy of the source code.

Source, $25.95 Foreign postage, add $5.00

Foreign postage excludes U.S. Territories and Canada. New rates eff. May 31, 1991

To order, please send U.S. check or money order to:

JWT Enterprises
5755 Lockwood Blvd.
Youngstown, OH 44512

Technical Assistance: **(216)-758-7694**

All products for Level 2 OS-9

RAINBOW CERTIFICATION SEAL

Sorry, no C.O.D.'s or credit cards; Foreign & Canadian orders, *please* use **U.S. money orders.**
U.S. checks, allow 3-4 weeks for receipt of first issue/back issue.

Copyright (C) 1991 OS-9 is a trademark of Microware Systems Corp. and Motorola, Inc.

because the ALE line on the MSM6242 is active High. This is done to satisfy microprocessors that use an ALE signal to distinguish address signals from data signals appearing on the same bus. This situation is seen with 8-bit Intel microprocessors. Again, since this is a write signal, it must go through the E gating chip.

U4 is the MSM6242 real-time-clock chip discussed last month. Apart from the memory-mapping circuitry referred to above, it requires just a few parts of its own.

Part	Description
U1	74HC138
U2	74HC04
U3	74HC157
U4	MSM6242
D1	1N5817
D2,D3	1N4004
R1	10-kilohm, 1/4-watt
C1	20-pF capacitor
C2	5-30-pF, variable cap
C3	4.7-uF electrolytic
C4,C5,C6	.1-uF capacitor
X1	32.768-KHz crystal

Figure 2: Parts List

X1 is the oscillator crystal that keeps the time accurate. It requires two small capacitors (C1 and C2) to oscillate properly. As shown in Figure 1, C2 is a variable capacitor and is used to fine tune the crystal. The rest of the parts are used to provide power to the RTC when the computer is off. D1 is a low-voltage-drop diode that allows power to get to the RTC when the computer is on and isolates the RTC from the power supply when the computer is off. This prevents the battery from supplying power to the rest of the computer. D3 is used to keep the computer's power supply from trying to charge the battery — usually these batteries are not rechargeable. You must change them every three to five years. C3 is used to keep the voltage to the RTC constant.

D2 and R1 form another protection circuit. D1 is connected to the computer's supply. The other side is connected to the CS1 (Pin 18) of the RTC. CS1 is an active High signal. When the signal to CS1 is Low, the RTC cannot be selected. This is an important point. When a computer is turned on, or off, signals start to rise, or fade, to their proper levels. But there is an instant when these changing signals might be interpreted as a valid signal. Imagine, as you turn your computer off, the RTC sees the signals as the CPU writing data to a time register, which trashes your time. This control line (CS1) is designed to turn off the RTC before invalid signals have time to write to it. R1 is used to ensure the signal to CS1 goes Low. On power-up, the RTC has a built-in reset timer that waits long enough for all signals to be stable before allowing any writing.

One last note on the MSM6242 — an X version is now available. This version is identical to the regular version, except the crystal and the two capacitors (C1 and C2) are internal to the chip. With the X version, there is no need for these parts; simply leave the two crystal pins unconnected. The internal capacitors are laser trimmed and very accurate, which makes tuning the capacitor unnecessary. The last three capacitors (C4, C5 and C6) are used for power decoupling and should be placed physically close to each chip.

Considerations and Modifications

The general circuit shown in Figure 1 can be applied in many ways. Of course, you'll need to make some small modifications if you plan to use it differently than I have described. The biggest consideration is physical placement. If you build this device, think carefully about where you want to place it. If it is going into a Disto product (with or without other expansion cards), make sure the circuit board will fit inside the case. A small, edgeless protoboard will work. If you want to insert it directly into the CoCo's cartridge slot, you will need a CoCo project-board. CRC may still have some of these.

Remember that the pinouts given in Figure 1 are for the MEB board. You'll need a CoCo cartridge pinout if you do otherwise. The only change is that the MEB connection now goes to the *SCS pin of the CoCo. This also mirrors several locations because the *SCS line is not fully decoded. In this case, you cannot run another device on the cartridge port. If you have a Multi-Pak, it has to be the only thing in that slot, unless you decode for the above memory area. The same is true for installing this inside your CoCo using the CoCo bus. You cannot connect another device without fully decoding the *SCS signal.

The CoCo has three I/O areas decoded. The *SCS area is available to the cartridge port, but the other two are internal only. They control things like the keyboard, cassette port, joysticks and video modes. For someone who has the CoCo's service manual and also understands the I/O areas, it is possible to tap into this area and leave the *SCS area totally untouched. These areas control the two internal PIAs of the CoCo. They are each 32 bytes long, just like the *SCS area. PIAs require only four bytes each. The other 28 bytes are mirrored. A small circuit could remove the mirroring and leave room for the RTC. In theory this should work, but I'll let you figure it out. Good luck!

Construction and Testing

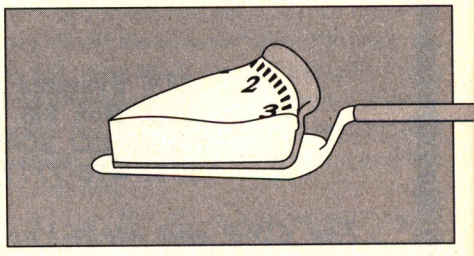
The only discussion left is that of building the RTC card. Figure 2 shows all the needed parts and their numbers. If you want to install this board inside the cover of your controller or MEB, you must not use sockets for the chips. Be careful when making solder connections. And again, check to make sure the board you choose fits inside the closed case. All wiring is shown in Figure 1, except the +5-volt and ground lines for each chip. The following is a list of these power connections:

Part	+5 Volts	Ground
U1	16	8
U2	14	7
U3	16	8
U4	18*	9

When you finish building the hardware, it's time to check your work. Two memory areas are used to access the RTC. The first area, $FF50, is for reading/writing data. The second area is $FF51. It is an address select register. To access any registers in the RTC, you must first store the address of that register in $FF51. Then any access to $FF50 corresponds with the selected register. Refer to my previous article for descriptions of all the registers. To see if the RTC is running, enter the following short program:

```
10 POKE &HFF51,15
20 POKE &HFF50,0
30 POKE &HFF51,14
40 POKE &HFF50,0
50 POKE &HFF51,13
60 POKE &HFF50,0
70 POKE &HFF51,0
80 PRINT PEEK(&HFF50)
90 GOTO 80
```

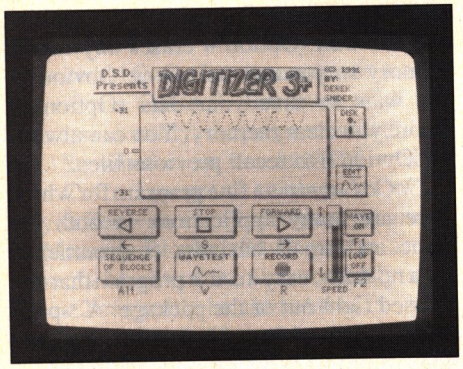
This program resets the RTC and starts the counting. Lines 80 and 90 form a loop and constantly print the contents of the seconds register. The number may be random, but as long as it increases by one every second or so, the RTC is working properly. Next time, we'll look at a BASIC program that properly uses the RTC.



Digital Sound — CoCo 3

The Digitizer 3+

Have you ever wanted to create a BASIC or machine-language game that can play sampled sounds without making the game seem choppy or have it freeze every time a sample is played? For years I have tried to accomplish such a feat with no success. Thanks to D.S.D. Software, average BASIC programmers like myself (when compared to the advanced machine-language programmer) are able to do just that.



D.S.D. Software has a new audio digitizer called *The Digitizer 3+* that allows you to sample sounds and merge them into your own programs. This is one of the first sound digitizers that uses the CoCo's FIRQ interrupt to produce multitasking sound capabilities. This means that when a digitized sound is used with a BASIC or machine-language program, both the sound and the program can operate simultaneously, without sluggishness to either (except during disk and tape I/O).

Sound is sampled through the left joystick port to use the capabilities of the 6-bit analog-to-digital converter (A-to-D). By using the 6-bit A-to-D, recorded samples produced by the program are higher in quality than 1-bit sound digitizers that use the cassette port.

The cable included with *The Digitizer 3+* provides a 1/8-inch female phone plug for the sound source. Optionally you can purchase adapters at most electronics parts stores, which allows you to use sound sources with different physical connections.

The program is very user-friendly. After you enter `RUN "DIGI3+"`, a title screen appears and the actual program loads. From the main screen you can do a wide variety of things, such as analyze incoming sound to adjust volume settings, record an incoming sound, play a recorded sound (forward or reverse), and adjust the speed. Sound is recorded in 8K blocks. The program allows you to pick the areas of memory in which you want the sound stored. In a 128K CoCo, the sound is usually stored in the HSCREEN graphics areas and other areas not used by the computer. This allows for about 5 to 15 seconds of recording, depending on the speed. Users with 512K CoCo 3s can use 47 more recording blocks, which allows several minutes of recording time.

Smaller menus provide for such functions as block merging (so two sound blocks can be mixed), block smoothing (for clearer sound), copying blocks from one to another, and editing blocks. All of these functions work great, but editing is a little time-consuming.

There are other features, such as sound looping (so sound can play continuously) and sound wave display on/off, which allows you to shut off the sound wave display. The last feature is the ability to save and load the sampled sounds not only as an entire sequence, but one block at a time.

In addition to the cable, the package includes two single-sided disks, which contain the program and some demos. The documentation consists of a seven-page, easy-to-read instruction manual that clearly explains how to use the program and how to incorporate the digitized sounds into your own programs.

The Digitizer 3+ is excellent and produces high-quality sound. The thing I like most is the program's use of multitasking to show the sound waves while a sample is recorded or played. I haven't yet seen a high-quality, multitasking digitizer for such a low price. My only criticism is that I think the cable should be a little longer, which would make it easier to get sound samples.

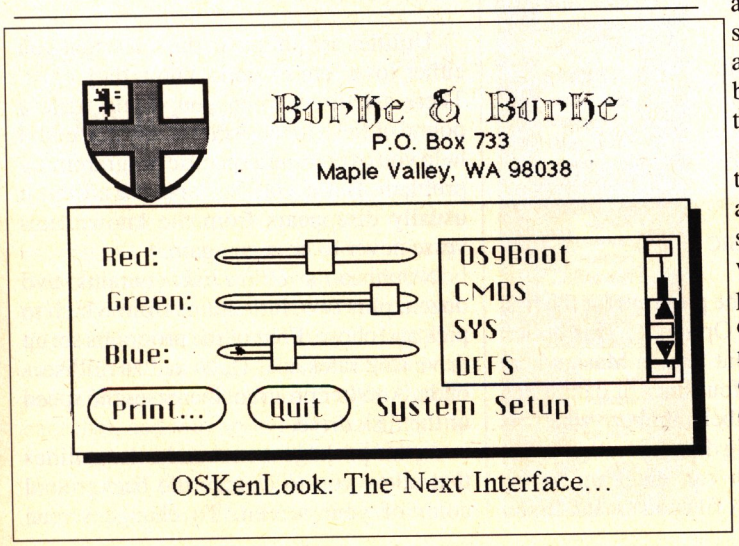
(D.S.D. Software, 17 Annapearl Ct., North York, ON M2N-4H6, Canada; 416-229-4479 [voice/fax line]; $29.95 U.S., $35.95 Cdn.; plus $3 S/H)

— David McNally

Utility — CoCo 1, 2 & 3

CoCo Labels

CoCo Labels is a nifty program for the CoCo 1, 2 or 3 with a disk drive and a printer. It's powerful, yet is easy to use with its menu-driven user interface. You can print as many labels as you like from a two-column, alphabetical list of people or businesses displayed on your screen.



(((((((NEW!)))))))
From MillSoft Co.
MillSofts' Baseball Card Catalog
by Paul Miller

NOW YOU CAN PUT ALL YOUR Baseball Cards on disk! Requires COCO3 with two Diskdrives and 128k. It is also available for 1 and 2 with tape drives.

To order, please send a check or money order to:
MillSoft Co. • Box 2377
Amagansett, NY 11930

$18.95. Please specify which System you have. NY Res., Please add 7.5% Tax.

Submitting Material To Rainbow

Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs that are useful, helpful and fun for other CoCo owners.

WHAT TO WRITE: We are interested in what you want to tell our readers. We accept for consideration anything that is well-written and has a practical application for the Tandy Color Computer. If it interests you, it will probably interest lots of others. However, we vastly prefer articles with accompanying programs that can be entered and run. The more unique the idea, the more the appeal. We have a continuing need for short articles with short listings. These are especially appealing to our many beginners.

FORMAT: Program submissions must be on tape or disk, and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs and debug our typing errors. All programs should be supported by some editorial commentary explaining how the program works. We also prefer that editorial copy be included in ASCII format on the tape or disk, using any of the word processors currently available for the Color Computer. Also, please include a double-spaced printout of your editorial material and program listing. Do not send text in all capital letters; use upper- and lowercase.

COMPENSATION: We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those wanting more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submission Guidelines, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you comprehensive guidelines.

Please do not submit material currently submitted to another publication.

Options include selecting just one name or all the names on the list, as well as using different fonts for the address lines. Although the program is written for Tandy printers, it's not difficult to modify for other dot-matrix printers. Supplied on the disk is a program called CONFIG that allows you to select the printer baud rate and number of disk drives attached to your computer. CONFIG writes all the selected parameters to your disk so you don't have to rerun it on each use. You should make a backup copy of the original disk and file the original for safe keeping. After running the boot file, you are presented with the following Main menu:

***CoCo Labels* is a fine program for which there are many applications in both the home and small business environments.**

New File
1. View/Print/Edit
2. Input Data
3. Print Options
4. Clear Memory
5. Save
6. Load
7. Return To BASIC

If you are using the program for the first time, you start with Option 2 . This option takes you to the Input Screen Mask where you can enter up to four lines of data. Each name is given a label number, which is useful when recalling data for further printing or editing. You can enter up to 100 names for each index file you create. If you need more than this, it's best to divide your list into two or more file groups (such as A-M and N-Z) and set up a separate disk file for each. Both upper- and lowercase characters are supported and selected with the familiar SHIFT-O keystroke. Editing is very easy and each line is shown on the screen with user prompts as to what to do with the line. After you have entered your data (names, addresses, etc.) you can select Option 1 to View, Print or Edit. A very nice feature of *CoCo Labels* is that no matter in what order you enter the names, the program automatically alphabetizes them for you.

Option 3 (Print Options) is a very useful command that lets you print all labels, a numbered series, or change fonts. Six font styles are supported: normal, underlined, elongated, condensed, elite and bold. You are prompted for each line as to which font you want to use. This makes for some pretty spiffy-looking labels that I found useful for disks as well. Option 4 erases any file in memory so you can start over. Obviously you want to save your data (Option 5) before you clear memory. You can always use Option 6 to recall previous files.

CoCo Labels is a fine program for which there are many applications in both the home and small business environments. It's a no-frills, easy-to-use program that can be used right out of the package. A 5-page instruction booklet with detailed explanations of program operation is included.

(The Trading Post, P.O. Box 3453, Carbondale, IL 62902-3453, 618-457-5258; $19.95, plus $3 S/H)

— Jerry Semones

Utility	CoCo 1, 2 & 3

Util Disk

Utilities are unique in the sense that you either love 'em or don't know they exist. There are times when you would trade a pound of flesh for a special utility that could help you overcome a specific programming problem. But if you don't need a utility, it usually disappears from the known universe never to be seen again.

N*Johnson's *Util Disk* contains two dozen, plus two, little items from which to pick and chose. Four of the programs set up drive step rates at 6, 12, 20 and 30 milliseconds. Another program increases the speed of the disk drive.

In this package are several color utilities that allow you to change the background color of your screen. To change screen

color, simply type CLS followed by a number that corresponds to your choice of color. Color choices range from numbers 1 through 16. You can also configure your screen to view either 40 or 80 columns. Another utility demonstrates rapid and slow palette flashing, while a third fixes the bug that only resets registers 0 through 14 with the CMP and RGB commands.

For those of you who want to alter columns, a couple of programs display a 64-column screen configuration. WIDTH 80 gives you a further demonstration for the application of two columns.

Also included in the package is a program that reconfigures RGB and CMP for monochrome monitors. If data is your concern, the disk includes a program that compresses data for storage and another file that decompresses it.

One file that caught my eye is CC2MODE. It is supposed to put a CoCo 3 into a CoCo 2 mode, so I used this utility and loaded a favorite old CoCo 2 program that refused to run on the CoCo 3. But even with this conversion utility, the program still did not run. So whether or not CC2MODE enables your CoCo 2 programs to run on a CoCo 3 may differ with each individual program.

Memory Blocks allows you to access memory blocks of 8K. Unfortunately, only Block 2 can really be used. All of the other blocks are reserved for other system usage.

The disk comes with five pages of documentation that describe the function of each utility. Most of the programs contain enough onscreen prompts for proper operation. So if you are into utilities, you may find something useful in this package. But if you would rather play another round of *Mutant Marauders from Space*, you won't want to bother — you'll either love it or leave it.

(N*Johnson Software, 5830A Reinke Dr., Crestview, FL 32536; $7.95)

— George Aftamonow

Game CoCo 3

Crystal City

Crystal City is terrific! To fully appreciate this statement, however, you need to understand that mine is a video family. Between my wife, my 9-year-old son and myself, we have four television sets, two VCRs, a Macintosh, three Color Computers, an Atari 400, an Atari 2600, two Nintendos and a Sega Genesis. So, it is truly significant that, as I was trying *Crystal City*, my son walked in and said, "Hey! This game looks Cool! Can I play?" A few moments later my wife walked in and remarked, "Wow, this game has good graphics! Which machine is it running on?"

Crystal City, written by Jeremy Spiller and available from Sundog Systems, is a space-arcade game that requires a Color Computer 3, a disk drive and a joystick. The game comes on two disks. One disk contains the program and one disk holds the data for the various levels of the game. The program disk is copy protected, but the data disk is not. If you register this program with Sundog Systems (as requested in the documentation) any game disk that fails to function in the first six months after the purchase is replaced free of charge. And each additional replacement is $5. The data disk is not covered by this warranty, but you are advised to run the program using a backup of the disk while keeping the original in a safe place.

The basic game mechanics of *Crystal City* are quite simple. You're in control of a ship that is armed with laser blasters. In a low-altitude streak across an alien landscape, you confront a dizzying assortment of enemy weapons and vehicles that you must avoid or pulverize. Your shields protect you from collisions and enemy fire, but each hit drains fuel. Fortunately, you can refuel in midflight by scooping up fuel parachutes you encounter along the way. If you make your way to the end of a level intact, you enter into a deadly dogfight with a heavily protected enemy ship.

The *Crystal City* scenario is hardly new. Indeed, *Crystal City* closely resembles the arcade classic, *Defender*. As with other Sundog Systems games, *Crystal City* is a splendid bit of programming that satisfies all the criteria for a great video game. And it's more fun than a barrel of tribbles!

Let's look at the things that make this a great game. First of all, a great video game must have great graphics. *Crystal City* uses the CoCo 3's horizontal hardware scrolling capability to provide a smooth flow of elaborate images across the screen. I was amazed (and often dismayed) at the number of enemy objects that blast away simultaneously, with nary a flicker on the screen. Helicopters, jet planes, stationary floating mines, ballistic missiles, and anti-aircraft shells fly from every direction.

Sound is another important feature of *Crystal City*. The various enemy weapons all have their own sound effects, in addition to the satisfying blast of your own lasers. The implementation of all of this noise is delightful and creates just the type of desperate excitement the game warrants. In addition, the big guy at the end of each level emits a unique cacophony that defies de-

Send for FREE CATALOG

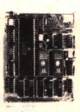
Turn your Tomcat™ into a TIGER!

The power of the 68000, even from BASIC!

The TIGER is a 68000 co-processor for the TOMCAT TC9 that runs at the blistering speed of 10 Mhz! That's over 5 times faster than the CoCo3! Some functions can be speeded up by as much as 8 times with the TIGER!

Now use all your existing RSDOS software and hardware AND have the power of the 68000 in the same cabinet. Amaze your friends with the speedup possible with the TIGER. If and when you want you can add OS9/Level II and speed that up by a factor of 2 or 3! You could also add OS9/68000 to the TIGER without sacrificing ANY of your existing software OR hardware. OS9/68000 runs on the TIGER with your drives etc. that are running from your TOMCAT TC9! NO extra hardware needed. Later, if you want, you can further improve the performance of the TIGER by adding modules (cards) to the TIGER on the K-Bus! Already there are more than 20 different cards available including memory cards, 2 and 4 port serial cards, 4 port parallel cards, SCSI and floppy controller cards, DMA (Direct Memory Access) cards, and more! With the TIGER you can use these cards even from BASIC! Just 'CALL THE TIGER'

You don't have to spend THOUSANDS to have the power of the 68000! As a matter of fact the TIGER introductory price is ONLY $129.95!



That's right! ONLY $129.95!

Now with the TIGER, FHL, long the leader in Color Computer hardware and software, brings the power of the 68000 within reach of Color Computer users without requiring that you abandon your existing hardware OR software. AND you get the ability to run ALL the software that will be available someday for the more expensive OS9/68000 computers.

So, why spend THOUSANDS today for a computer with little software when for JUST $129.95 you can have the SAME power, run the SAME software, for one TENTH the cost!

$129.95

The TIGER is in stock for immediate delivery!

Call today for our complete catalog and newsletter with more information on the TIGER and the TOMCAT TC9, It's FREE!

* The TIGER requires the TOMCAT TC9 to run.

ORDERING INFORMATION

VISA and M/C, check and C.O.D. Contensial U.S. software shipping add $5.00 Ground - $8.00 Two Day Air. Hardware add $15 ground - $27 Two Day Air. Please call for Next Day Air costs and C.O.D. Foreign add 10% Shipping (Minimum $5 USD). NY residents please add 7% sales tax.

FRANK HOGG LABORATORY

Since 1976
204 Windemere Road
Syracuse, NY 13205
FAX 315/469-8537

Call 315/469-7364

scription, but is incentive enough to get this far just to listen and laugh.

A great game should be just plain fun. Crystal City is a blast

Video games should be easy to learn, but difficult to master. *Crystal City* succeeds on both of these counts. The controls are simple and responsive. It is possible (as my son demonstrated) to entirely skip the instructions and just start playing the game. However, conquering all six levels is something my son and I could not accomplish in several lengthy sessions of play, which means we will get many more hours of enjoyment out of the game before beating it and retiring it alongside our copy of *Super Mario Brothers*.

Reward sequences are something too often overlooked by game developers. When I finally manage to accomplish a major objective in a game, I want something for it. Unfortunately, in many games the reward is either minuscule, unimaginative and boring, or — in the worst case — too long with no way to interrupt it. In *Crystal City*, when a level has been successfully completed, the reward sequence is a fireworks display of blue, green, pink and purple balls randomly bouncing around the screen exploding into bursts of color that fade into even more balls. It is a marvelous display that lasts until being turned off with a touch of the firebutton.

Finally, a great game should be just plain fun. *Crystal City* is a blast. It's challenging, fast-paced, exciting and left me wanting more.

I cannot offer much criticism of this program. The only thing that annoyed me was that the written game background was too elaborate and became downright boring. The lengthy tale of the hero, Luki Jaiwaka, and the evil Roixx dragged on for 2½ typed pages, but it seemed like more. The tone could have easily been set in far fewer words.

Beyond this small criticism, *Crystal City* from Sundog Systems is a top-notch package I heartily recommend.

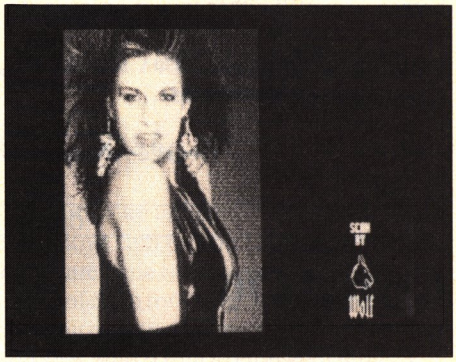
(Sundog Systems, P.O. Box 766, Manassas, VA 22111; 703-330-8989; $34.95, plus $2.50 S/H)

— Jim K. Issel

Graphics CoCo 3

NIB Swimsuits & Lingerie, Volume I

The graphics capability of our beloved CoCo has always been one of its strongest selling points. Over the years, many CoCoists have collected graphics images for their libraries. The phrase "You've come a long way, baby" is a rather good summation of the CoCo graphics achievements so far. First, there were the PMODE pictures. Then, with the CoCo 3 came the HSCREENs and the many wonderful drawing programs that followed. For people demanding even more realistic pictures, there is yet another type of graphics image — the digitized picture.



The pictures in the *NIB Swimsuits & Lingerie* disk set are digitized images, probably taken from various magazines. For lack

Plug-N-Go...

7 Color Printer!

NX-1001 MULTI-FONT

RAINBOW NX-1020

This next generation color printer sets new standards in color printer performance... 225 cps, 4 NLQ fonts including Script, plus a new high speed draft font; but the enhancements don't stop there. Add a 16k buffer, a special quiet mode, top feed, bottom and rear tractor, and the list goes on. Seven on-demand colors, 8 color graphics modes, Epson and IBM emulation for maximum software compatibility. Virtually everything desired in a printer is here - *speed, color and versatility* at an affordable price with a 2 year warranty.

OUR *PLUG 'N GO FOR THE COCO* SYSTEM INCLUDES:
- NX-1020 Rainbow Multi-Font Printer
- Blue Streak Ultima
- Software Support Disk
- Color Super Gemprint

$249.95 +$10 Shipping & Insurance

This enhanced version of the legendary NX-1000II is the latest low-cost high-performance printer from Star Micronics. Fully featured with 4 NLQ plus a draft font. 10 character sizes from subscript to quadruple size, 4k buffer, 180 cps, friction and tractor feed, and much much more. Backed by a 2 year warranty. Epson and IBM emulation modes for maximum software compatibility. A performer so versatile you may never exhaust it's creative possibilities.

OUR *PLUG 'N' GO FOR THE COCO* SYSTEM INCLUDES:
- NX-1001 Multi Font Printer
- Blue Streak Ultima
- Software Support Disk

$188.88 +$10 Shipping & Insurance

Order Your System Today... Call (513) 885-5999

All Dayton Associate's products have a 30 day moneyback guarantee.

DAYTON ASSOCIATES of W.R. Hall, INC.
9644 Quailwood Trail • Spring Valley, Ohio 45370

Visa & Master accepted within the continental U.S.
Ohio residents add 6.5% sales tax
COD add $4.00

Shipping charges to Canada, P.R., HI, AK, APO, FPO are double. Triple charge to all other countries.

Epson is a registered trade mark of Seiko Epson Corp. IBM is a registered trade mark of International Business Machines Corp. Price and Specifications are subject to change without notice.

of a better definition, the quality of these pictures rivals black-and-white TV images. The pictures are four-color (white, light gray, dark gray and black) HSCREEN4 images with a resolution of 640 by 200.

I'll tread lightly in my review of these pictures, which are obviously not of a subject matter easily described in a family magazine. The five-disk set contains over 60 images of buxom women in various stages of scant decoration (this *is Swimsuits & Lingerie*). And be forewarned, the last few exhibits display *no* woven decoration.

The images are crisp DS69-B screens compressed using the *NIB Compressor* offered by Rick's Computer Enterprise. Each disk in the set contains 12 to 14 images. To view these files, your system must include a CoCo 3 with a disk drive and a monitor or TV. The NIB loader/viewer programs are included with the author's permission, and there is one for RGB and another for composite monitors.

Loading and viewing the pictures is a simple process of running the viewer, typing a selected filename and pressing ENTER. The picture is uncompressed onscreen, and in a few seconds the final image appears.

The quality of the pictures ranges from good to excellent. If you have no qualms about the content of the pictures, and the set fills a niche in your graphics library, then take a gander. The price is reasonable.

(Steve Ricketts, P.O. Box 1048, Fairview, OR 97024; 503-663-7391 [9 a.m. to 2 p.m., Mon.-Fri.]; $15)

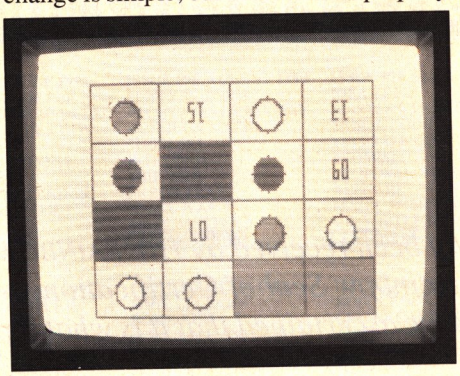
— Jamie Hensen

Game	CoCo 1, 2 & 3

Match'em

If you are going to reinvent the wheel, it should be a whitewall wheel with chrome spokes. *Match'em* is like the numerous versions of *Concentration* that have appeared in THE RAINBOW over the years. The object of this one-player game is to match pairs of colored squares and circles in as few attempts as possible. To play, use either the keyboard or joystick to position an onscreen cursor on one of the 16 numbered squares, and press the fire button (or ENTER) to see what is in the square. Then choose another square and try to match the previous square. Repeat this process until all eight pairs of squares have been matched. And for future reference, the game automatically records the total number of tries it takes you to complete the game.

Match'em runs on a CoCo 1, 2 or 3, but it is recommended that you change a line in the program if you use a CoCo 1 or 2. The change is simple, but I feel that if I plop my



hard-earned money down on a computer program, the program should run without having to change or rewrite lines. This program could easily execute such an option by using a simple GOSUB command.

The program comes with one double-sided page of documentation.

There are only two objects — a square and a circle — drawn on the PMODE3 screen. This does not make for a very interesting graphics presentation. The game also lacks colorful, graphically pleasing title and playing screens. If the game had used the sharper PMODE4 screen with some unique shapes and an option for more difficult grids (for example, 5-by-5, 6-by-6 or 7-by-7), then I might recommend *Match'em* as a nice pastime for people of all ages. As it is, the game might be suitable for small children. The program works, but if you're looking for Hi-Res graphics it may not be for you.

(Johnson Software, P.O. Box 92, Dayton, OH 45449; 513-866-2601; $9)

— George Aftamonow

...For the CoCo

The Smallest, Sleekest, Fastest Serial To Parallel Converter You Can Buy!

7 Switchable Baud Rates
300 • 600 • 1200 • 2400 • 4800 • 9600 • 19200

Use this "smart" cable to connect a Centronics parallel printer to any version CoCo or use it to improve performance of your current printer. The cables are long-life, high quality shielded cables with moulded plugs for extra durability.

$34.95 +$2 Shipping

Software Support Disk $19.95
(free with purchase of printer)

TYPE SELECTION/ TUTORIAL
Online instructional program that will select 24 special features of your printer or display methods to incorporate them into your programs

HI-RES SUPER GEMPRINT
Disk software that will transfer a Hscreen 1,2,3 or 4 picture screen to printer. Grey level shading for color.

SUPER GEMPRINT
Will transfer a Pmode 0, 1, 2, 3, or 4 picture screen to printer 8"x11" hardcopy. Black/white, white/black or grey level shading for color.

COLOR SUPER GEMPRINT
Transfers color screens to Color NX-1020. 8"x11" hardcopy in any Pmode or Hscreen mode.

Order Your System Today... Call (513) 885-5999
All Dayton Associate's products have a 30 day moneyback guarantee.

DAYTON ASSOCIATES of W.R. Hall, INC.
9644 Quailwood Trail • Spring Valley, Ohio 45370
Shipping charges to Canada, P.R., HI, AK, APO, FPO are double. Triple charge to all other countries.

Visa & Master accepted within the continental U.S.
Ohio residents add 6.5% sales tax
COD add $4.00

Received and Certified

The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, your assurance that we have seen the product and have ascertained that it is what it purports to be.

◈ **High Finance**, a point-and-click financial-analysis program designed for use either with *Multi-Vue* or as a stand-alone under OS-9 Level II. One interesting feature of the program is the *MVTutor* online-tutorial system. With *MVTutor*, you can learn to use the program or easily remind yourself about some forgotten function without reference to the user's manual. *High Finance* includes present/future value, sinking fund, loan amortization, depreciation and many other useful financial computations. Minimum hardware requirements are a CoCo 3 (256K/512K recommended), one disk drive, a mouse or joystick, and a printer. Optionally, you can use a RAM disk for increased execution speed. Software requirements are OS-9 Level II and the `windint` module, available from Tandy in the *Multi-Vue* software package. *MV Systems, P.O. Box 818, Arvada, CO 80001; (303) 420-7777; $24.95, plus $2.50 S/H.*

Match 'em, a game of concentration for the CoCo 1, 2 or 3 with a disk drive. Use either a joystick or the keyboard to position the screen cursor, and find the eight matching pairs of colored squares and circles on a four-by-four grid. If you find a match in shape and color, the match remains on the board. If the two selections do not match, the contents of those squares are covered again. The five top scores are stored in a permanent disk file. *Johnson Software, P.O. Box 92, Dayton, OH 45449; (513) 866-2601; $9 plus $2 S/H.*

KJV on Disk #21, Proverbs, Ecclesiastes and Song of Solomon from the King James version of the Bible in ASCII files for the CoCo 1, 2 and 3. A word processor or text editor is recommended for viewing the files. Requires at least 32K and one disk drive. *BDS Software, P.O. Box 485, Glenview, IL 60025-0485; $3.*

Util Disk, is a disk containing 26 useful utilities, including programs to change drive-step rates and turn on monochrome video. Disk BASIC 1.1 or 2.1 is required for the disk utilities. A CoCo 3 is also required for some of the utilities. *N*Johnson Software, 5830A Reinke Drive, Crestview, FL 32536; (904) 682-2907; $7.95.*

M10 Clipart for *MAX-10*, comes on five double-sided, unprotected flippy disks and requires the *MAX-10* word processor from Colorware. *M10 Clipart* is a collection of 300 clip pieces covering such topics as seasons, letters, astrology, office, school, occupation, transportation, money, sports, faces, animals, and more. M10 clip pieces can be loaded and inserted into *MAX-10* with the Paste File option from the Edit menu. The accompanying user's guide displays every clip picture and its location on the individual disks. *M10 Clipart* includes no viewing utility, so the user's guide is very important for quickly finding pictures. *Coless Computer Design, 1917 Madera St. #8, Waukesha, WI 53186; (414) 549-0750; $19.95 plus $3 S/H.*

The Digitizer 3+, a powerful machine-language program for digitizing, sampling and sequencing 6-bit sound on the CoCo 3. This digitizer will actually multitask digitized sound with machine language or BASIC. Now you can have digitized sound in your games and programs without stopping the operation of your program. *The Digitizer 3+* provides an onscreen waveform at all times, and the editor allows you to alter the waveform. Includes a cable, manual and two disks. *D.S.D. Software, 17 Annapearl Ct., North York, ON M2N-4H6, Canada; (416) 229-4479; $29.95 U.S., $35.95 Cdn.; plus $3 S/H.*

◈ **First product received from this company**

The *Seal of Certification* is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the program does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

Without T&D your Coco is a Barebone System

ISSUE #95, MAY 1990
DREAMTIME ADV.
XT/AT SYSTEMS
BIBLE QUIZ 2
16 FLAGS
FRACTIONS
SOLITAIRE PUZZLE 4
512K RAM DRIVE 3
FOOD FACTORY 3
WHO PART 2
TRAPFALL

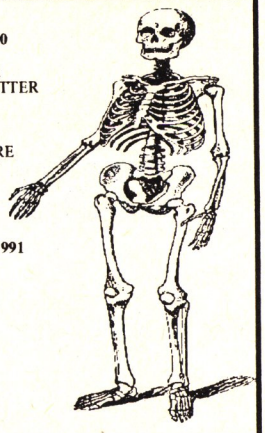
ISSUE #96, JUNE 1990
ENTREPENEUR
DR. PHRED!
PRINTER FONT CODES
BIBLE QUESTIONS PT. 3
CALO ADVENTURE
FORM MAKER
DRAGON ESCAPE
PLANE EXPLORER
WHO PART 3
MS. MAZE

ISSUE #97, JULY 1990
FCC EXAM HELPER
EMPLOYEE SCHEDULE
FLYING SAUCER ADV.
SPEECH AID
MOWER MADNESS
JET TRIVIA
INSTANT CALENDAR
WORLD MASTER 3
AIR WAR 3
SKRAMBLE

ISSUE #98, AUGUST 1990
FLIPPY TUTORIAL
RECIPE/MEAL/GROCERY
DUNGEON MAZE
SNOW SKI
HOT LOAD
SHIP WAR
ERROR TRAP
SPACE WAR 3
MAZE MASTER 3
WIZARD'S DEN

ISSUE #99, SEPT., 1990
IDEA TREE
MASTER'S LABYRINTH
MORSE CODE
TELESALE CONTACTS
PROMISED LAND QUIZ
PROPOSAL WRITER
ALPHABET SCRAMBLE 3
MAGIC PUMPKIN
DR. WHO3 PART 4
FANGMAN

ISSUE #100, OCT. 1990
ZOT MIND GAME
SUPER TEXT EDITOR
SUPER TEXT FORMATTER
TURTLE SEARCH 3
COAST TO COAST
EASY BASIC 3
DRAGON ADVENTURE
WRITE OUT UTILITY
TRY THIS
DONUT DILEMMA



ISSUE #101, NOV. 1990
GOSSIP
COST ESTIMATOR
SALO INVENTORY
PERSONAL STATS
ALAIX - 3
DEATH HUNT
512K RAM CAT. 3
Bingo Caller 3
DUCK HUNT
THE FROG

ISSUE #102, DEC. 1990
REAL ESTATE ANALYSIS
COCO PAYROLL
DR. STRANGE ADV.
TANNING SALON
TREASURE HUNT
RIVERBOAT BLACKJACK
TURTLE RACE 3
SUPER SCREEN DUMP
KEYBOARD REMAP
CRASH

ISSUE #103, JAN. 1991
FAMOUS PEOPLE
LABRYNTH 3
DATA ANALYSIS
MEDICAL FILE
WORD GENERATOR 3
PRIVATE EYE ADVENTURE
HEARTS 3
COCO JOKESTER
TETRAPAK 3
ELECTRON

ISSUE #104, FEB. 1991
WINE CELLAR
BOMB RUN
SPLIT/APPEND FILES
INITIALIZE 35 +
PIG OUT
CRYPTOGRAM 3
GHOST HUNTER
HI-COPY
LEARN!
SR-71

ISSUE #105, MARCH 1991
ROBOCROOK
CREDIT CARD ACCT.
ABC'S ' 123'S
ANTIQUE COLLECTOR
FOUR SCORE
QUICK TAX
HI-LOAD
QUAD EDUCATION 3
SMURF QUEST 3
BUZZWORM

ISSUE #106, APRIL, 1991
STOCK PORTFOLIO
THE BARREL
SERVICE MANAGER
CROSUMS PUZZLE
DIAMOND QUEST
JOB SKILLS
JOB APPLICANT
ELDUS 3
BREAK-IN3 PART 2
KATERPILLAR II

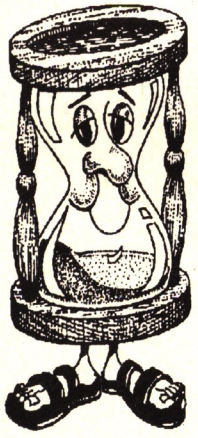
Last 12 issues shown here!

Tom Mix arcade games.

RAINBOW CERTIFICATION SEAL

Don't waste a minute!
Check out all our public domain issues.

RAINBOW CERTIFICATION SEAL



Music 1-7
M1 - 8 Utilities & 8 Songs
M2 - 17 Musica Files
M3 - 16 Musica Files
M4 - 16 Musica Files
M5 - 25 Orchestra Files
M6 - 23 . Bin Files ready to play
M7 - 23 .Bin Files ready to play

Graphics 1-14
GR1 - Atlanta, Cube, Space +
GR2 - Objects, Wargame, Worldmap, +
GR3 - 9 Coco 3 Graphic programs.
GR4 - 22 Coco Max Pictures
GR5 - 22 Coco Max Pictures
GR6 - 22 Coco Max Pictures
GR7 - 15 Coco Max Pictures
GR8 - 22 .BIN Pictures
GR9 - 22 .BIN Pictures
GR10 - 14 Large .BIN Pictures
GR11 - 8 MGE Pictures
GR12 - Coco Max 3 Pictures
GR13 - Macpaint Graphic Editor
GR14 - 5 Macintosh Pictures

Adventures 1,2
A1 - CIA, Death Ship, Gargoyle, Kingdom, Kingtut - Odeysey, Nuclear Sub, Werewand, Willsadv
A2 - Andrea Doria, Curse, Ghostship, Hogjowl - Icewar, Quest, Sorcerer, Survival, Adv. Gen.

Telecommunications 1-3
T1 - Haysae, Kermit, Mikeyterm, Teleterm
T2 - Cobbs BBs Terminal Package
T3 - Geterm Communications

Education 1-4
E1 - 12 Programs for young kids.
E2 - 12 Programs for High School Kids
E3 - 11 Programs Teach the Coco's Commands
E4 - 5 Graphic Programs About Australia

HOME MANAGEMENT 1-4
*12 Programs Each Disk/Tape
H1 - Calendar, Financial Advise, Typing Tutor, +
H2 - Check, Last Will, Word Processor, +
H3 - Envelope, Finance, Interest Rate, +
H4 - Speeling Fix, Spelling Checker, +

Utitlites 1-8
12 Programs Each, U1-U4 Require Disk
U1 - Dir32, Disk Zapper, Rom Copy, Snap, +
U2 - Backup, Disktest, Label, Offset, +
U3 - Convert, Disk Library, Play Mac, Relocate, +
U4 - Bin>Basic, Disk Master, Unarc, Unlock, +
U5 - Assembler, Basic 64, Database, Recover, +
U6 - 64 Look, HGR Color, LLIST 32, Tape Type, +
U7 - Letter head print with 30 mini pictures
U8 - Fig Forth language with tutorials!

GAMES 1-11
*Each Disk/Tape Contains 12 Programs *
GA1 - Blackbox, Car race, Horses, Startrek +
GA2 - Chess, Rider, Rubic, Vapor worm, +
GA3 - Backgammon, Gremlin, Poker, Robots, +
GA4 -Hawks, Lunar World, Saucer, Shootem, +
GA5 - Battleship, Chicken, Raceway, Squash, +
GA6 - Kings Army, Navyguns, Shipsub, Tanks, +
GA7 - Connect 4, F-16, Pizza, Rubic, +
GA8 - Football, Germ Attack, Othello, Slither, +
GA9 - Battle, Flight, Max Graphics, Prix, +
GA10 - Blockade, Life, Missile2, Scramble, +
GA11 - Bunker 3, Guadal, Nuke Attack, Traders, +

Mail To:

T&D Subscription Software
2490 Miles Standish Drive
Holland MI 49424
(616) 399-9648
Fax: (616) 396-2744

VISA master charge

Prices:

Single Issue (Tape or Disk)...	$ 8.00
2-5 ISSUES.....	$ 6.00 Ea.
6-10 Issues.....	$ 5.00 Ea.
11 or more Issues.....	$ 4.50 Ea.
All our software (189 disks).....	$ 279.00
One year subscription.....	$ 60.00

*All issues conatain 6-15 ready to run programs on disk or tape.
*Original software includes documentation.
*We send first class! No charge.
*Personal checks welcome.
*Write for a free catalog.
*Programs are for Coco 1,2 or 3.

Original Software

1	16	31	46	61	76	91	106
2	17	32	47	62	77	92	
3	18	33	48	63	78	93	
4	19	34	49	64	79	94	
5	20	35	50	65	80	95	
6	21	36	51	66	81	96	
7	22	37	52	67	82	97	
8	23	38	53	68	83	98	
9	24	39	54	69	84	99	
10	25	40	55	70	85	100	
11	26	41	56	71	86	101	
12	27	42	57	72	87	102	
13	28	43	58	73	88	103	
14	29	44	59	74	89	104	
15	30	45	60	75	90	105	

Public Domain

M1	GR1	E1	U1	GA1
M2	GR2	E2	U2	GA2
M3	GR3	E3	U3	GA3
M4	GR4	E4	U4	GA4
M5	GR5		U5	GA5
M6	GR6	H1	U6	GA6
M7	GR7	H2	U7	GA7
	GR8	H3	U8	GA8
A1	GR9	H4		GA9
A2	GR10			GA10
	GR11			GA11
T1	GR12			
T2	GR13			
T3	GR14			

Name _____
Address _____
City _____ State ____ Zip ____
Credit Card # _____
Expiration _____ Total $ _____

Please Circle : TAPE or DISK

Passing Parameters

THE RAINBOW Staff

I had a tough time figuring out how to pass single variables from one procedure to another in BASIC09 — I just experimented until I hit a combination that worked. Now I'm writing a program in which I need to pass variables in an array from procedure to procedure. The problem is that when the program encounters the RUN statement, it jumps immediately to the called procedure. I can find no way to use a loop so I can pass all the elements of the array between the necessary procedures. Surely there must be some provision for this if BASIC09 is the great programming system others say it is. Can you help?

James E. Parsons
Granite City, Illinois

BASIC09 does provide a powerful environment in which to write programs. Yet, as with any powerful system, learning the nuances of this environment takes time.

Refer to Page 11-108 of the BASIC09 section in the Level II manual. Under the subheading of Parameters for the PARAM statement, you'll discover that arrays (and even complex data structures defined using the TYPE statement) are passed in the same manner as simple variables. That is, the PARAM statement is used to define the data structure (simple variable, array, etc.) in the same way you would dimension it locally in a procedure.

To illustrate, we built the two procedures shown in Figure 1a. Build_Array dimensions a 5-by-5 element array (array) and loads it with values as shown in Figure 1b. Once the procedure finishes initializing array, it calls Print_Array using array as a parameter. Print_Array receives array *by reference* (see Page 6-8 in the BASIC09 section) and prints it in tabular form. Note our use of PRINT USING formatting to achieve even rows and columns on the printout.

The concept of multiple procedures (and the ability to easily pass data between them) allows you to write programs that are much easier to follow and debug. Further it allows you to write specific modules to handle data in a certain way and use that module in several different programs — you can build your own BASIC09 "procedure library."

Getting Free

I love using "Larry's Labeler" (May 1990, Page 46) to print disk labels. I have created labels for all my OS-9 disks and glued them to the disk jackets.

```
PROCEDURE Build_Array
 0000       DIM j,k,array(5,5):INTEGER
 0018
 0019       FOR j=1 TO 5
 0029         FOR k=1 TO 5
 0039           array(j,k)=(j-1)*5+k
 0052         NEXT k
 005D       NEXT j
 0068
 0069       RUN Print_Array(array)
 0073       END

PROCEDURE Print_Array
 0000       PARAM array(5,5):INTEGER
 0010       DIM j,k:INTEGER
 001B
 001C       FOR j=1 TO 5
 002C         FOR k=1 TO 5
 003C           PRINT USING "i4>",array(j,k);
 004F         NEXT k
 005A         PRINT
 005C       NEXT j
 0067       END
```

Figure 1a: Passing an Array

```
array

   1   2   3   4   5
   6   7   8   9  10
  11  12  13  14  15
  16  17  18  19  20
  21  22  23  24  25
```

Figure 1b: Contents of array

```
PROCEDURE Get_Free
 0000       PARAM Device:STRING
 0007       DIM Line:STRING[80]
 0013       DIM Path:BYTE
 001A
 001B       ON ERROR GOTO 10
 0021       DELETE "free.info"
 002E 10    ON ERROR
 0034
 0035       SHELL "free "+Device+" >free.info"
 0050       OPEN #Path,"free.info":READ
 0064       READ #Path,Line
 006E       READ #Path,Line
 007B       PRINT Line
 007D       READ #Path,Line
 0087       PRINT Line
 008C       READ #Path,Line
 0096       PRINT Line
 009B       END
```

Figure 2: Retrieving Free Space

However, I'd like to include information about the free space remaining on the disks. I studied the source code and my OS-9 books, and I can get the program to print `Capacity:` *and* `Free:` *in the header, but I haven't been able to get it to read this information from the* `free` *message. How can I accomplish this?*

Daniel Statham
FPO Seattle

The easiest way to print this information is to simply put the line

```
SHELL "free >/p"
```

at the appropriate point in the program. This assumes the OS-9 `free` command is available in memory or in your current execution directory. Also, you must include the appropriate device (drive) name if it is different from the current device. The drawback is that all the information provided by `free` is printed, too.

To get around having to print the unnecessary information, you could redirect the output of `free` to a file, for example `free.info`. As this file is ASCII, you could then have BASIC09 open it and perform string manipulations to get the desired information. While this sounds like a long way to go, it is a perfect educational programming opportunity. Figure 2 shows a sample procedure you might use to perform this task.

Pass the Word

CoCoPRO! of Ypsilanti, Michigan, has aquired Alpha Software Technologies and its line of OS-9/6809 products. In addition, CoCoPRO! is working to introduce OSK versions of several of those products, providing a means of enhancing the OSK platform on the new machines.

Memory Overload

I have no problem running OS-9 and BASIC09, but I haven't been able to run any BASIC09 program that contains `RUN gfx`, `RUN gfx2` *or* `RUN printline`. *The system keeps reporting an Error #043 (unknown procedure). I have tried loading* `gfx`, `gfx2`, `runb`, `basic09` *and* `inkey` *separately. These modules load fine, but the problem still occurs. I have enough gray hair and don't need any more. Please help.*

Daniel L. Imanski
Milwaukee, Wisconsin

The description for Error #043 is very misleading and often results in frustrating wild-goose chases. Let's backtrack a little. You loaded the individual modules, so you *know* they are in memory. But you may not be aware that each is occupying at least one 8K block of memory — even those that are smaller than 8K (`inkey` is only 94 bytes in length). The lengths of the modules are

Module	# Bytes
`basic09`	23244
`runb`	12185
`gfx`	501
`gfx2`	2250
`inkey`	94
`syscall`	99

Since the smallest block of memory an individual module can occupy is 8K, loading `basic09`, `gfx`, `gfx2` and `inkey` uses six 8K blocks, or 48K of the total memory in the system. (There should be no need to load `runb` unless you plan on executing *packed* BASIC09 programs, too.) OS-9 gives each application (BASIC09 is an application) a working space of 64K, or eight 8K blocks. A module's 8K block isn't mapped into this workspace until the module is called — it just sits there in your 512K until needed.

When you load BASIC09, it takes three 8K blocks. As your program calls `gfx`, `gfx2` and `inkey`, further 8K blocks are filled. But you need room for your program, too. If it is a big program, chances are you set aside the memory when you started BASIC09.

BASIC09 faithfully loads the modules as they are called by your program. But after calls to one or two of the modules (depending on how much memory you've allocated for your program), you're down to zero free blocks left in the 64K application workspace. When you call a new module, the system cannot map it into the workspace. BASIC09 can't even determine if the module exists, so you receive the Error #043 message. And it doesn't matter if you previously loaded the module or let BASIC09 handle it for you.

We need to find a way to more efficiently use the memory required for the modules. The solution is to merge the modules together to better fill an 8K block, without going over that amount. If we add the byte totals for `gfx`, `gfx2`, `inkey` and `syscall`, we find their combined size is 2944 bytes — far less than 8K. The merged module will occupy only one 8K block. To do this, load the `attr` command from your system disk, insert a *backup* of your BASIC09 disk in Drive `/d0` and enter `chd /d0/cmds`. (Or use `chd` to select the directory holding the BASIC09 modules listed above.) Now enter

```
merge gfx gfx2 inkey syscall >b
09modules
```

Make the file executable (loadable) by entering

```
attr b09modules e pe
```

Before you start BASIC09, enter `load b09modules`. The merged modules use only one block and all are available to BASIC09. And as long as you don't allocate more than 32K (the four free blocks) for your program, you won't get hit with those nasty errors.

Your questions regarding OS-9 are welcome. Please address them to OS-9 Hotline, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to us through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services. Then at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the OS-9 Hotline online form.

10th YEAR of The RAINBOW®

An index to the articles, reviews and authors appearing in issues of THE RAINBOW from July 1990 to June 1991.

This is the eighth index to THE RAINBOW. Previous indices appear each July, starting with the July 1984 issue. To complete your RAINBOW library, you'll find more information on how to get back issues with your favorite programs and articles on Page 63 of this issue.

BUSINESS

Tinklepaugh, Dale. "Bond Calculator"; CoCo1/CoCo2/CoCo3; February 1991, p.56. Computerized guidance for calculated risks. BONDCALC.

COMMUNICATIONS

Boudreaux, Andrew T. "CoCo TV"; CoCo1/CoCo2/CoCo3; December 1990, p.62. Start your own cable-TV series with help from a friend. HEADER.
Issel, Jim K. "Terminal Entries"; November 1990, p.62. Get a handle on some current communications programs.
Kessler, Gary C. "Brief Introduction to Modems, A"; November 1990, p.12. Introduction to data communications using modems.
Kuns, Eddie. "Database Report"; July 1990, p.62. "Binary Potpourri".
Kuns, Eddie. "Database Report"; August 1990, p.14. "Uploads Galore!".
Kuns, Eddie. "Delphi Bureau"; September 1990, p.70. "Online Interactions".
Kuns, Eddie. "Delphi Bureau"; October 1990, p.68. "New Machines Coming".
Kuns, Eddie. "Delphi Bureau"; November 1990, p.58. "New Delphi Rates".
Kuns, Eddie. "Delphi Bureau"; December 1990, p.58. "The Delphi Mailman".
Kuns, Eddie. "Delphi Bureau"; March 1991, p.61. "The Mad Slasher".
Kuns, Eddie. "Delphi Bureau"; April 1991, p.54. "Conference".
Kuns, Eddie. "Delphi Bureau"; May 1991, p.22. "Conference Control".
Kuns, Eddie. "Delphi Bureau"; June 1991, p.22. "Online Efficiency".
Olive, Tony. "Going Online: Primed and Ready"; November 1990, p.46. A quick look at a first-timer's online discoveries.
Smith, Jay. "Cracking the Nautical Code"; CoCo3; August 1990, p.10. A BASIC program that teaches you international code flags. CODEFLAG.

EDITORIAL COMMENT

Augsburg, Cray. "Wrapping the Rainbow"; July 1990, p.92. "Debugging THE RAINBOW".
Augsburg, Cray. "Wrapping the Rainbow"; August 1990, p.95. "The Tenth Round".
Augsburg, Cray. "Wrapping the Rainbow"; October 1990, p.95. "The Year Ahead".
Augsburg, Cray. "Wrapping the Rainbow"; April 1991, p.75. "Unwrapping the RAINBOW".
Falk, Lonnie. "Print#-2"; July 1990, p.8. "Happy Anniversary".
Falk, Lonnie. "Print#-2"; August 1990, p.8. "A Bright Horizon".
Falk, Lonnie. "Print#-2"; September 1990, p.8. "It All Started With Education".
Falk, Lonnie. "Print#-2"; October 1990, p.8. "Graphically Speaking".
Falk, Lonnie. "Print#-2"; November 1990, p.8. "World Net".
Falk, Lonnie. "Print#-2"; December 1990, p.8. "Unto What Far Harbor?".
Falk, Lonnie. "Print#-2"; January 1991, p.8. "Keeping the Spirit".
Falk, Lonnie. "Print#-2"; February 1991, p.8. "Documented Evidence".
Falk, Lonnie. "Print#-2"; March 1991, p.8. "Come One, Come All".
Falk, Lonnie. "Print#-2"; April 1991, p.8. "CoCo Hits a High Note".
Falk, Lonnie. "Print#-2"; May 1991, p.8. "My First Printer".
Falk, Lonnie. "Print#-2"; June 1991, p.8. "Binary Blueprints".

EDUCATION

Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; July 1990, p.86. "Search the World Over". MAP.
Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; September 1990, p.46. "The Melting Pot". AMERICAN.
Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; November 1990, p.54. "Check Your Calendar". CALENDAR.
Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; January 1991, p.34. "A Trip to the Post Office". MAIL.
Carrock, Solla. "Fishing for the Right Words"; CoCo1/CoCo2/CoCo3; January 1991, p.64. Try your creative hand at writing poetry. FISHBOWL.
Meijering, Rudy. "Solid Foundation in Chemistry"; CoCo3; February 1991, p.66. CoCo becomes a chemistry tutor. CHETUTOR.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; August 1990, p.30. "EZ-Thello Plays Back". EZTHELO2.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; September 1990, p.36. "Money 'n Math". MATHGEN3.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; October 1990, p.34. "Between Numbers". BETWEEN2.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; November 1990, p.66. "CoCo Tours the States". STATES.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; December 1990, p.28. "The Tour Continues". MATCH50.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; January 1991, p.40. "Visualizing Fractions 2". VISFRAC2.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; February 1991, p.40. "Visualizing Fractions 3". VISFRAC3.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; March 1991, p.20. "Visualizing Fractions 4". VISFRAC4.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; April 1991, p.58. "Lifeskills 7". LIFESKL7.

GAMES

Becker, Rob. "Who Dunnit?"; CoCo1/CoCo2/CoCo3; August 1990, p.67. Find the clues with this detective game. DETECTO.
Bloedow, Grant. "Stevedores"; CoCo3; November 1990, p.10. A ship-shape version of a popular Russian game. STEVEDOR.
Bush, James. "Easy Come, Easy Go"; CoCo1/CoCo2/CoCo3; April 1991, p.20. Betting with a Solitaire card game. EASYGO.
Carroll, James R. "Blackjack"; CoCo1/CoCo2/CoCo3; March 1991, p.10. Play a winning round. BLAKJACK.
Cooper, Rick. "All the Knight Moves"; CoCo3; October 1990, p.92. An original idea for chess players. CHESSIQ.
Delbourgo, Bob. "In the Name of Equality"; CoCo1/CoCo2/CoCo3; January 1991, p.61. A number-scramble game. EQUALITY.
Harris, Dale. "Banzai!"; CoCo3; September 1990, p.18. Earn a black belt in joystick karate. KARATE.
Harris, Warren & Harris, Neil. "KnightShift"; CoCo1/CoCo2/CoCo3; May 1991, p.16. A game of medieval conquest. KNIGHT.
Hegberg, Joel Mathew. "Better Letters"; CoCo3; December 1990, p.46. Build more interconnected words to win. ADD-ON.
Hoin, Dennis. "Make or Break"; CoCo1/CoCo2/CoCo3; June 1991, p.65. Get ahead in this real-life game. SCREEN51.
Quellhorst, George. "Pyramid"; CoCo3; May 1991, p.78. An addictive, easy-to-play solitaire game. PYRAMID.
Ridings, David. "Tic-Tac"; CoCo3; April 1991, p.50. A game classic. TIC-TAC.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; July 1990, p.54. "Old Game, New Twist". EZTHELLO.
Stakelin, II Carl J. "Knight's Errant"; CoCo3; July 1990, p.90. Doin' the white/black shuffle. KNIGHT.
Steidl, Jeff. "Just Between Terminals"; CoCo1/CoCo2/CoCo3; July 1990, p.28. Play the role of a data communications chip. DATATRAN.
Webb, Mark. "Darts"; CoCo3; February 1991, p.83. Throw darts on (not at) your CoCo's screen. DARTS.

GENERAL

Augsburg, Cray. "Printer Primer, The"; May 1991, p.28. A guide to printer terms and features.
Goff, Kelly. "Ninth Year of Rainbow, The"; July 1990, p.64. An index of articles, programs, reviews, and authors.
Myers, Nancy. "Stuff"; August 1990, p.92. A computer widow's tale.
Rainbow Staff. "RAINBOWfest 1990"; March 1991, p.48. Photos from the Chicago 1990 show.

GRAPHICS

Curtis, H. Allen. "Ultralace, the First Loop"; CoCo3; May 1991, p.10. The ultimate shoestring desktop publisher. GENFMENU.
Curtis, H. Allen. "Ultralace: the Second Loop"; CoCo3; June 1991, p.51. Programs that create the Design menu and screen dumps. GENDMENU.
George, Tom. "Picture This!"; CoCo3; October 1990, p.10. Spectra 3: full-featured graphics editor. MAKESPEC.
Hunt, Matthew. "Plot a Lot"; CoCo3; September 1990, p.10. Make abstract math formulas concrete. GRAPH.
Ludwig, John. "Doublewide"; CoCo1/CoCo2/CoCo3; August

1990, p.44. Print double graphics screens side-by-side. DBLWIDE.
Stroffolino, Phil. "Jumpman"; CoCo1/CoCo2/CoCo3; February 1991, p.28. A quick look at the basics of graphics animation. JUMPMAN.
Wolf, Eric A. "Pie Plotter"; CoCo3; January 1991, p.83. Create your own pie charts. PIECHART.

HARDWARE

Boone, Ken. "CoCo Data Logger"; CoCo3; March 1991, p.16. Monitor real-world events. COCODL.
Distefano, Tony. "Turn of the Screw"; August 1990, p.48. "Build Your Own EPROM Programmer".
Distefano, Tony. "Turn of the Screw"; September 1990, p.66. "EPROM Programmer, Part II".
Distefano, Tony. "Turn of the Screw"; CoCo1/CoCo2/CoCo3; October 1990, p.64. "EPROM Programmer, Part III". MAKEPROM.
Distefano, Tony. "Turn of the Screw"; December 1990, p.52. "EPROM Programmer Handbook".
Distefano, Tony. "Turn of the Screw"; January 1991, p.36. "How Cold Is It?".
Distefano, Tony. "Turn of the Screw"; March 1991, p.31. "How Cold Is It?: Part II".
Distefano, Tony. "Turn of the Screw"; May 1991, p.46. "Multiple A-to-D Input".
Distefano, Tony. "Turn of the Screw"; June 1991, p.58. "On CoCo Time".
Goodman, Marty. "A Monitor for the CoCo 3"; March 1991, p.14. An update on monitors for the CoCo 3.
Houk, Cecil C. "MIDI Mods"; April 1991, p.62. Fighting back against barely sufficient synthesizer designs.
Lorbieski, Richard. "Turbo Light"; May 1991, p.53. A bright idea for monitoring clock speed on the CoCo 3.
Merryman, Robert C. "Disk Controller ROM Selector"; March 1991, p.34. Switch between two disk ROMs.
Phillips, Charles F. "Soldering Fundamentals"; March 1991, p.44. Soldering tips for the hardware tinkerer.

HOME APPLICATION

Wyss-Gallifent, S. "Doc Reader"; CoCo3; May 1991, p.49. View and print text files quickly and easily. READDOC.

HOME APPLICATIONS

Dufur, Glen. "Home Budget Analyst 4.0"; CoCo1/CoCo2/CoCo3; February 1991, p.10. Record and maintain your personal budget. BUDGET.
Hart, Timothy W. "Handy Labeler"; CoCo3; July 1990, p.10. LABEL.
Haverstock, Mark & Wills, Bill. "CoCo Home Video Companion"; December 1990, p.10. Let the CoCo 3 create titles, credits, graphics for videos.
Perlman, Richard. "Do-It-Yourself Database, Part V"; CoCo1/CoCo2/CoCo3; July 1990, p.36. A database to track household financial information. RETRV.
Walters, Francis M. "Spread a Sheet for Heat Loss"; CoCo1/CoCo2/CoCo3; September 1990, p.60. Using spreadsheets for heat-loss calculations.

MUSIC

Pillot, Giancarlo. "Music Catalog"; CoCo1/CoCo2/CoCo3; November 1990, p.56. An instrumental program for tracking your tunes. MUSIC.
Quellhorst, George. "Resounding CoCo"; CoCo3; April 1991, p.10. A graphical rewite of Music+. MUSIC3+.

NOVICES NICHE

Barberian, Richard. "Weights on Other Planets"; CoCo1/CoCo2/CoCo3; February 1991, p.91. Weight computation for all heavenly bodies. WEIGHTS.
Barberian, Richard. "Your Age in Days"; CoCo1/CoCo2/CoCo3; November 1990, p.26. Calculate your current day age. AGEDAYS.
Bartels, Andrew. "Border Color Change"; CoCo3; January 1991, p.24. A utility to enhance CoCo 3 screen displays. BORDER.
Bernico, Bill. "Hi-Res Input Editor"; CoCo3; October 1990, p.37. Allow user input on the Hi-Res screen. INPUT3.
Bernico, Bill. "Winning Combo, A"; CoCo3; October 1990, p.37. Create your own dice. DICE.
Braxmaier, Jay. "Color Ball"; CoCo1/CoCo2/CoCo3; September 1990, p.59. Play pinball with a paddle instead of a flipper. COLRBALL.
Cho, Jamie L. "Module Buster"; CoCo1/CoCo2/CoCo3; January 1991, p.94. An OS-9 utility that breaks down files of merged modules. BUST.B09.
Coolman, William W. "Bank Account"; CoCo1/CoCo2/CoCo3; February 1991, p.38. A simple program to help balance your checkbook. BANK.
Davis, Shawn M. "Directory Alphabetizer"; CoCo1/CoCo2/CoCo3; January 1991, p.55. Arrange disk filenames in alphabetical order. DIRALPHA.
Ebacher, Jerome. "Addition"; CoCo1/CoCo2/CoCo3; September 1990, p.93. Timing drills to improve math skills. ADDITION.
Elliott, Phil. "Coloring"; CoCo3; January 1991, p.44. Use your own colors to fill designs on the graphics screen. ING.
Enger, David C. "Quick Directory Sorter"; CoCo1/CoCo2/CoCo3; February 1991, p.54. A machine-language, directory-sorting utility. DIRSORT.
Estrado, Richard. "Freedom"; CoCo1/CoCo2/CoCo3; April 1991, p.53. A graphics program of randomly-moving snake lines. FREEDOM.
Fingliss, Douglas. "Craps"; CoCo1/CoCo2/CoCo3; March 1991, p.57. A game of rolling the dice. CRAPS.
Friesen, Geoff. "Automatic Error Entry"; CoCo3; February 1991, p.92. Enter the EDIT mode automatically on error detection. AUTOERR.
Friesen, Geoff. "Descriptive Error Messages"; CoCo3; October 1990, p.51. User-friendly error messages. ERRMSG.
Friesen, Geoff. "Last Line Recall"; CoCo3; October 1990, p.87. Redisplay the last command line you entered under BASIC. LASTLINE.
Friesen, Geoff. "Line Copy"; CoCo1/CoCo2/CoCo3; August 1990, p.70. Copy single BASIC program lines from place to place. LCOPY.
Friesen, Perry. "Music Test"; CoCo3; April 1991, p.31. Learn the lines and spaces on the bass and treble clefs. MUSICTST.
Hennon, Tim. "Music Grid"; CoCo3; April 1991, p.60. Create random musical tones and flashing lights. MUSCGRID.
Hooper, Marvin. "Compound Interest"; CoCo1/CoCo2/CoCo3; May 1991, p.55. A simple program to compound interest for specific periods. COMP - INT.
Johnson, Neil. "Slot Machine"; CoCo1/CoCo2/CoCo3; June 1991, p.20. A CoCo game that brings Las Vegas to you. SLOT.
Kenny, Keiran. "Angles on the CoCo"; CoCo3; December 1990, p.73. An educational introduction to trigonometry. COCOTRIG.
Kenny, Keiran. "CoCo 3 Joystick"; CoCo3; August 1990, p.59. A simple joystick doodling program. JOYSTK3.
Kenny, Keiran. "Graphics Experiments"; CoCo3; March 1991, p.78. Some hints on graphics programming. HSCR4EXP.
Kenny, Keiran. "Hi-Res Art Pie"; CoCo3; June 1991, p.18. Learn how to determine and set screen coordinates. HIRESPIE.
Kenny, Keiran. "Hot Gold"; CoCo1/CoCo2/CoCo3; December 1990, p.57. Find the hidden treasure. HOTGOLD.
Kenny, Keiran. "Neat Labels"; CoCo1/CoCo2/CoCo3; February 1991, p.24. Print address labels from data statements. LABELS.
Kenny, Keiran. "Peeking at 135"; CoCo1/CoCo2/CoCo3; November 1990, p.75. Use Address 135 for monitoring user input. PEEK135.
Knapik, Steve. "Loans"; CoCo1/CoCo2/CoCo3; February 1991, p.29. Quickly find monthly payments and interest on loans. LOANS.
Larson, Richard. "Timer"; CoCo1/CoCo2/CoCo3; February 1991, p.60. CoCo makes a countdown timer. TIMER.
Liming, Douglas. "Pop-up Menus"; CoCo1/CoCo2/CoCo3; November 1990, p.52. Expedite the menu-creating process. POPUP.
Ling, Sharon. "Huck Bucks"; CoCo1/CoCo2/CoCo3; December 1990, p.50. Make play money with the CoCo and a printer. HUCKBUCK.
McCarthy, James. "Credits"; CoCo1/CoCo2/CoCo3; March 1991, p.9. Let CoCo roll the credits for your production. CREDITS.
Milam, Loy. "Ohm's Law"; CoCo1/CoCo2/CoCo3; March 1991, p.42. Ohm's-law calculator. OHMS-LAW.
Moore, Mike. "Directory Lister"; CoCo1/CoCo2/CoCo3; January 1991, p.86. Send the directory listing to the printer. DIRLIST.
Mosley, John. "Spiral"; CoCo3; August 1990, p.42. A look at spiralized triangles. SPIRAL.
Musumeci, John. "Note Writer"; CoCo3; February 1991, p.92. A quick note and memo editor. NOTERITE.
Musumeci, John. "Note Writer 2 x 40"; CoCo3; June 1991, p.16. Print 80-column notes and letters without the hassle. NOTE2X40.
Reighard, Kenneth. "Air Raid"; CoCo1/CoCo2/CoCo3; September 1990, p.31. A high-flying action game. RAID.
Rogers, Robert. "Laser Cycles"; CoCo1/CoCo2/CoCo3; November 1990, p.60. An action-video game with color graphics and sound. LASER.
Ross, James. "OS-9 File Viewer"; CoCo3; May 1991, p.9. Use keys to scroll forward and backward through ASCII files. SCROLF.B09.
Tandberg, Dan. "Wormy"; CoCo1/CoCo2/CoCo3; December 1990, p.20. Steer the growing worm without hitting anything. WORMY.
Taulli, T.C. "Space Kamikaze"; CoCo1/CoCo2/CoCo3; May 1991, p.80. A shoot-'em-up arcade game of kamikaze destruction. SPACE.
Teague, Bob. "Body Mass"; CoCo1/CoCo2/CoCo3; February 1991, p.90. Determine your optimum weight. BODYMASS.
Thompson, Ernie. "Adding Machine"; CoCo1/CoCo2/CoCo3; November 1990, p.36. A printing, adding-machine program. ADD.
Turowski, Donald. "Car Quest"; CoCo1/CoCo2/CoCo3; June 1991, p.18. The license-plate game for those trips in the car. CARQUEST.

OS-9

Boynton, David P. "Ring the Alarm"; CoCo3; December 1990, p.41. A look at sounding the alarm under OS-9. ALARM.B09.
Cheek, Joseph. "Menu System"; CoCo3; April 1991, p.38. Build your own menu system. MS.B09.
Goldberg, Stephen B. "Append"; CoCo1/CoCo2/CoCo3; January 1991, p.68. A multi-purpose text-file utility. APPEND.ASM.
Goldberg, Stephen B. "For Your Eyes Only"; CoCo1/CoCo2/CoCo3; July 1990, p.32. Logon protection for the single-user OS-9 system. LOG.ASM.
Goldberg, Stephen B. "Sort"; CoCo1/CoCo2/CoCo3; March 1991, p.28. A utility to sort lines in text files. SORT.ASM.
Goldberg, Stephen B. "Tree Grows in OS-9, A"; CoCo1/CoCo2/CoCo3; February 1991, p.62. Print a directory tree for your disks. TREE.ASM.
Jackson, Christopher. "If Wife = Sue, Bring Your Potato Salad"; CoCo1/CoCo2/CoCo3; September 1990, p.83. An interpretive mail-merge utility. TSMAIL.
Kientzle, Tim. "Displaying Picture Files OS-9, Part III"; CoCo3; December 1990, p.34. Another look at data-compression techniques. SETBUFFER.B0.
Kientzle, Tim. "Displaying Picture Files Using OS-9"; CoCo3; November 1990, p.48. Run-length decoding techniques and displaying images. GETLINE.
Kientzle, Tim. "Getting the Picture With OS-9"; CoCo3; October 1990, p.44. Picture-storage formats and displaying images with OS-9. VEF.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; July 1990, p.72. "The Missing Link".
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; August 1990, p.72. "BASIC09 Interfacing". GETID.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; September 1990, p.28. "Reading and Writing". PRINT_TEST.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; October 1990, p.30. "Easy Access". OPEN_TEST.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; December 1990, p.87. "'tis the C Zen".
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; January 1991, p.52. "The C Zen Continues". TEST_1.C.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; February 1991, p.22. "'tis Still the C Zen". READ_TEST.C.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; March 1991, p.72. "The Auto Formatter". AUTO.B09.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; April 1991, p.28. "Making Directories". MAKEDIR.C.
Law, Greg. "BreakPoint"; CoCo3; May 1991, p.20. "Graphics Functions".
Law, Greg. "BreakPoint"; CoCo3; June 1991, p.28. "Cause for Arguments".
Macias, David. "Appreciatin' Depreciation"; CoCo1/CoCo2/CoCo3; February 1991, p.46. Learn to get along with depreciation calculations. DEPRECIATE.B.
Mikel, Jeff. "OS-9 Assembly Language"; CoCo3; June 1991, p.40. A guide for assembly-language programmer moving to OS-9. FIRST.A.
Pittman, Larry. "Weights and Measures"; CoCo3; January 1991, p.28. Quickly convert from one type of measurement to another. MEASURE.B09.
Puckett, Dale. "KISSable OS-9"; CoCo3; July 1990, p.48. "Loan Procedures for MVFinance". UPDATE1.
Puckett, Dale. "KISSable OS-9"; CoCo3; August 1990, p.38. "CoCo 3 Does Windows".
Puckett, Dale. "KISSable OS-9"; CoCo3; September 1990, p.39. "OS-9 Gets the Grades". GRADEBOOK.
Puckett, Dale. "KISSable OS-9"; CoCo3; October 1990, p.58. "OS-9 Graphics Primitives". OBJECTS.SCR.
Puckett, Dale. "KISSable OS-9"; CoCo3; November 1990, p.27. "Automating the Online Experience". MENUSETUP.
Puckett, Dale. "KISSable OS-9"; December 1990, p.21. "Legends of the C".
Puckett, Dale. "KISSable OS-9"; CoCo3; January 1991, p.46. "Basic Instructions".

PROGRAMMING

Barden, William. "Barden's Buffer"; CoCo1/CoCo2/CoCo3; July 1990, p.20. "Son of Perplexing Puzzles". COINTOSS.
Barden, William. "Barden's Buffer"; August 1990, p.60. "The Future of the CoCo".
Barden, William. "Barden's Buffer"; CoCo1/CoCo2/CoCo3; September 1990, p.32. "The Sound of the Touch". KEYPAD.
Barden, William. "Barden's Buffer"; October 1990, p.38. "Programming Structure".
Barden, William. "Barden's Buffer"; CoCo1/CoCo2/CoCo3; November 1990, p.40. "CoCos and Laser Jets". CCGRAPH.
Barden, William. "Barden's Buffer"; CoCo1/CoCo2/CoCo3; December 1990, p.54. "Contest Results". CARDPUZL.
Barden, William. "Barden's Buffer"; CoCo3; April 1991, p.32. "EZ Assembler". EZASM.
Barden, William. "Barden's Buffer"; CoCo3; May 1991, p.38. "Using EZASM". CLRSCN.
Barden, William. "Barden's Buffer"; CoCo3; June 1991, p.60. "EZ Assembler Guidebook". SORTDRV.
Barnes, James. "Frustration Extinguisher"; CoCo1/CoCo2/CoCo3; August 1990, p.36. A quickie listing formatter. LISTER.
Bergmann, Dean. "Life Without Line Numbers"; CoCo1/CoCo2/CoCo3; August 1990, p.64. Will the virtues of BASIC09 never cease. PRINTNAME.
Isted, Bruce. "CoCo 3 GIME CART* IRQs Explained"; CoCo3; August 1990, p.20. A software technique that ends cartridge-interrupt problems. IRQPOLL.ASM.
Law, Greg. "Organized Chaos"; June 1991, p.10. Programming techniques.
Nee, William P. "Assembly Line, The"; CoCo1/CoCo2/CoCo3; September 1990, p.48. Simulating movement and change in the game of life. EATING1.
Nee, William P. "Assembly Line, The"; CoCo1/CoCo2/CoCo3; October 1990, p.54. Teaching your computer to read and modify BASIC. INPUT.
Nee, William P. "Assembly Line, The"; CoCo1/CoCo2/CoCo3; November 1990, p.32. An imaginary machine (Turing) comes to life. TURING1.
Nee, William P. "Assembly Line, The"; CoCo1/CoCo2/CoCo3; February 1991, p.30. Graphing with a permutation of Mandelbrot. MANDEL1.
Nee, William P. "Assembly Line, The"; CoCo1/CoCo2/CoCo3; March 1991, p.51. Moving and twisting pictures on the graphics screens. WARP1.
Nee, William P. "Assembly Line, The"; CoCo1/CoCo2/CoCo3;

May 1991, p.56. Food for thought in the game of life. PREDATOR.
Nee, William P. "Assembly Line, The"; CoCo1/CoCo2/CoCo3; June 1991, p.76. Searching word puzzles. WORDPUZL.
Nee, William P. "Assembly Line, The,"; CoCo1/CoCo2/CoCo3; August 1990, p.52. A machine-language, spiral-graph program. SPIRO1.
Zore, Ernest F. "Programming Quick Tips"; July 1990, p.61.

QUESTION & ANSWER

Boeldt, Larry. "BASICally Speaking"; July 1990, p.26. Error-Trapping Troubles.
Goodman, Marty. "CoCo Consultations"; July 1990, p.58. "Bridge the 68000 Gap".
Goodman, Marty. "CoCo Consultations"; August 1990, p.62. "Hard Drives for 68K".
Goodman, Marty. "CoCo Consultations"; September 1990, p.52. "Programming the PIAs".
Goodman, Marty. "CoCo Consultations"; October 1990, p.52. "Disk-Drive Blues".
Goodman, Marty. "CoCo Consultations"; November 1990, p.24. "Shifting Gears".
Goodman, Marty. "CoCo Consultations"; December 1990, p.68. "GIME Ghostbusters".
Goodman, Marty. "CoCo Consultations"; January 1991, p.56. "Best Timing for 512K".
Goodman, Marty. "CoCo Consultations"; February 1991, p.94. "Disk Drive Power".
Goodman, Marty. "CoCo Consultations"; March 1991, p.38. "Sound Advice".
Goodman, Marty. "CoCo Consultations"; April 1991, p.46. "Modem Upgrades".
Goodman, Marty. "CoCo Consultations"; May 1991, p.42. "Memory Upgrades".
Goodman, Marty. "CoCo Consultations"; June 1991, p.63. "Terminal Programs".
Rainbow Staff, The. "OS-9 Hotline"; May 1991, p.34. "OS-9 Guidance".

UTILITY

Friesen, Geoff. "BASIC+"; CoCo3; June 1991, p.32. Several new commands for BASIC. MKDAT.
Jorgenson, Mike. "Disk Master 3"; CoCo3; January 1991, p.10. Seven menu-driven utilities to take control of your system.

REVIEWS

"1-Meg Upgrade"; August 1990, p.83.
"1990 CoCo Tax Estimator"; October 1990, p.75.
"512K Copy Utility"; January 1991, p.77.
"Arcade Factory, The"; September 1990, p.76.
"Arkanoid"; August 1990, p.76.
"Baby BASIC"; November 1990, p.71.
"Bankman"; May 1991, p.67.
"Barbarian Quest"; July 1990, p.83.
"Bed"; April 1991, p.66.
"Brainbuster Examiner"; March 1991, p.64.
"Brainbuster Testwriter"; March 1991, p.68.
"C3 Fonts"; July 1990, p.78.
"CC3FAX"; April 1991, p.68.
"CEBBS 2.1"; November 1990, p.72.
"CIII D-Link"; September 1990, p.74.
"CIII Lettrex"; December 1990, p.77.
"CIII Pages Enhanced"; December 1990, p.78.
"COMERR"; February 1991, p.78.
"Caveman"; April 1991, p.70.
"Classic Solitaire"; October 1990, p.80.
"CoCo Archiver"; March 1991, p.66.
"CoCo MIDI Pro"; February 1991, p.74.
"CoCo Yahtzee"; June 1991, p.71.
"CoCothello"; June 1991, p.72.
"Connecting the CoCo to the Real World"; December 1990, p.80.
"DMP-PIC Utility"; July 1990, p.80.
"DS69View"; February 1991, p.72.
"DSDisk #1"; May 1991, p.70.
"Delta Pro"; May 1991, p.64.
"Directory Library"; February 1991, p.74.
"Diskette File Protector"; June 1991, p.71.
"Education Galore"; October 1990, p.78.
"Elite*Xfer"; October 1990, p.74.
"Entity, The"; December 1990, p.76.
"File Recovery System"; March 1991, p.68.
"Firespire"; November 1990, p.78.
"First Prize"; April 1991, p.64.
"Gallery Maker"; June 1991, p.73.
"Games Pack I"; November 1990, p.81.
"Goldberg Utilities, The"; December 1990, p.74.
"Goodies Disk One"; February 1991, p.79.
"Grafix Disk Package"; November 1990, p.76.
"Graphics Utility"; March 1991, p.67.
"Honor Quest"; May 1991, p.69.
"Hot CoCo!"; October 1990, p.72.
"Inside OS-9 Level II"; August 1990, p.80.
"Joy"; July 1990, p.76.
"Keyboard Template"; September 1990, p.79.
"Killer Hawk"; July 1990, p.80.
"Kyum Gai: to be Ninja (OS-9 version)"; April 1991, p.72.
"La Belle Lucie"; February 1991, p.76.
"Labelbase"; November 1990, p.80.
"Level II Tools"; April 1991, p.68.
"MVCanvas"; October 1990, p.83.
"Mailman"; January 1991, p.75.
"Master Catalog"; September 1990, p.76.
"Math.l Library"; April 1991, p.66.
"Mind-Roll"; November 1990, p.72.
"Minigolf"; March 1991, p.64.
"Mixed Blessings"; February 1991, p.80.
"Morse CW"; July 1990, p.74.
"NFL Helmets Scrapbook"; January 1991, p.78.
"Nib Processor"; June 1991, p.73.
"Notes II"; August 1990, p.81.
"OS-9 Level II BBS"; September 1990, p.74.
"Overlord"; August 1990, p.78.
"Picture Bingo"; May 1991, p.67.
"Picture Disk 1"; February 1991, p.75.
"Picture Disks #5 & #6"; May 1991, p.68.
"Planet Engine Version 1.1"; December 1990, p.79.
"Power Stones of Ard II"; August 1990, p.78.
"Presto Partner"; July 1990, p.78.
"Print5"; October 1990, p.76.
"Pyramid Solitaire"; October 1990, p.74.
"Quest for Thelda, The"; November 1990, p.83.
"Rainbow Indexes"; February 1991, p.78.
"Rampage"; November 1990, p.73.
"Rascan 2.4"; December 1990, p.83.
"Revelation"; October 1990, p.77.
"Scripteller"; January 1991, p.72.
"Seventh Link"; July 1990, p.74.
"SmartWatch Drivers"; June 1991, p.74.
"SoundTrax"; January 1991, p.76.
"SoundTrax Instrument Disks"; April 1991, p.70.
"Space Ace"; January 1991, p.72.
"Space Raiders"; July 1990, p.79.
"Spectral Forces"; October 1990, p.79.
"Spell Master"; January 1991, p.78.
"Sprite-BASIC"; November 1990, p.78.
"Star Micronics Printer"; September 1990, p.79.
"StarPic"; January 1991, p.80.
"Super Comics+"; June 1991, p.70.
"SuperFile III"; August 1990, p.76.
"Superbook"; March 1991, p.70.
"T&D Cassette #93"; December 1990, p.74.
"T&D Issues #91 & #92"; January 1991, p.74.
"Tuty"; October 1990, p.78.
"VED/VPRINT"; February 1991, p.72.
"Wild & MV Version 2.1"; July 1990, p.77.
"Wiz, The"; November 1990, p.75.
"Word Power 3.3"; September 1990, p.72.
"Word Search"; August 1990, p.80.
"Zenix"; November 1990, p.71

AUTHORS

Augsburg, Cray. "Printer Primer, The"; May 1991, p.28. A guide to printer terms and features.
Augsburg, Cray. "Wrapping the Rainbow"; July 1990, p.92. "Debugging THE RAINBOW".
Augsburg, Cray. "Wrapping the Rainbow"; August 1990, p.95. "The Tenth Round".
Augsburg, Cray. "Wrapping the Rainbow"; October 1990, p.95. "The Year Ahead".
Augsburg, Cray. "Wrapping the Rainbow"; April 1991, p.75. "Unwrapping the RAINBOW".
Barberian, Richard. "Weights on Other Planets"; CoCo1/CoCo2/CoCo3; February 1991, p.91. Weight computation for all heavenly bodies. WEIGHTS.
Barberian, Richard. "Your Age in Days"; CoCo1/CoCo2/CoCo3; November 1990, p.26. Calculate your current day age. AGEDAYS.
Barden, William. "Barden's Buffer"; CoCo1/CoCo2/CoCo3; July 1990, p.20. "Son of Perplexing Puzzles". COINTOSS.
Barden, William. "Barden's Buffer"; August 1990, p.60. "The Future of the CoCo".
Barden, William. "Barden's Buffer"; CoCo1/CoCo2/CoCo3; September 1990, p.32. "The Sound of the Touch". KEYPAD.
Barden, William. "Barden's Buffer"; October 1990, p.38. "Programming Structure".
Barden, William. "Barden's Buffer"; CoCo1/CoCo2/CoCo3; November 1990, p.40. "CoCos and Laser Jets". CCGRAPH.
Barden, William. "Barden's Buffer"; CoCo1/CoCo2/CoCo3; December 1990, p.54. "Contest Results". CARDPUZL.
Barden, William. "Barden's Buffer"; CoCo3; April 1991, p.32. "EZ Assembler". EZASM.
Barden, William. "Barden's Buffer"; CoCo3; May 1991, p.38. "Using EZASM". CLRSCN.
Barden, William. "Barden's Buffer"; CoCo3; June 1991, p.60. "EZ Assembler Guidebook". SORTDRV.
Barnes, James. "Frustration Extinguisher"; CoCo1/CoCo2/CoCo3; August 1990, p.36. A quickie listing formatter. LISTER.
Bartels, Andrew. "Border Color Change"; CoCo3; January 1991, p.24. A utility to enhance CoCo 3 screen displays. BORDER.
Becker, Rob. "Who Dunnit?"; CoCo1/CoCo2/CoCo3; August 1990, p.67. Find the clues with this detective game. DETECTO.
Bergmann, Dean. "Life Without Line Numbers"; CoCo1/CoCo2/CoCo3; August 1990, p.64. Will the virtues of BASIC09 never cease. PRINTNAME.
Bernico, Bill. "Hi-Res Input Editor"; CoCo3; October 1990, p.37. Allow user input on the Hi-Res screen. INPUT3.
Bernico, Bill. "Winning Combo, A"; CoCo3; October 1990, p.37. Create your own dice. DICE.
Bloedow, Grant. "Stevedores"; CoCo3; November 1990, p.10. A ship-shape version of a popular Russian game. STEVEDOR.
Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; July 1990, p.86. "Search the World Over". MAP.
Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; September 1990, p.46. "The Melting Pot". AMERICAN.
Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; November 1990, p.54. "Check Your Calendar". CALENDAR.
Blyn, Steve. "Education Notes"; CoCo1/CoCo2/CoCo3; January 1991, p.34. "A Trip to the Post Office". MAIL.
Boeldt, Larry. "BASICally Speaking"; July 1990, p.26. Error-Trapping Troubles.
Boone, Ken. "CoCo Data Logger"; CoCo3; March 1991, p.16. Monitor real-world events. COCODL.
Boudreaux, Andrew T. "CoCo TV"; CoCo1/CoCo2/CoCo3; December 1990, p.62. Start your own cable-TV series with help from a friend. HEADER.
Boynton, David P. "Ring the Alarm"; CoCo3; December 1990, p.41. A look at sounding the alarm under OS-9. ALARM.B09.
Braxmaier, Jay. "Color Ball"; CoCo1/CoCo2/CoCo3; September 1990, p.59. Play pinball with a paddle instead of a flipper. COLRBALL.
Bush, James. "Easy Come, Easy Go"; CoCo1/CoCo2/CoCo3; April 1991, p.20. Betting with a Solitaire card game. EASYGO.
Carrock, Solla. "Fishing for the Right Words"; CoCo1/CoCo2/CoCo3; January 1991, p.64. Try your creative hand at writing poetry. FISHBOWL.
Carroll, James R. "Blackjack"; CoCo1/CoCo2/CoCo3; March 1991, p.10. Play a winning round. BLAKJACK.
Cheek, Joseph. "Menu System"; CoCo3; April 1991, p.38. Build your own menu system. MS.B09.
Cho, Jamie L. "Module Buster"; CoCo1/CoCo2/CoCo3; January 1991, p.94. An OS-9 utility that breaks down files of merged modules. BUST.B09.
Coolman, William W. "Bank Account"; CoCo1/CoCo2/CoCo3; February 1991, p.38. A simple program to help balance your checkbook. BANK.
Cooper, Rick. "All the Knight Moves"; CoCo3; October 1990, p.92. An original idea for chess players. CHESSIQ.
Curtis, H. Allen. "Ultralace, the First Loop"; CoCo3; May 1991, p.10. The ultimate shoestring desktop publisher. GENFMENU.
Curtis, H. Allen. "Ultralace: the Second Loop"; CoCo3; June 1991, p.51. Programs that create the Design menu and screen dumps. GENDMENU.
Davis, Shawn M. "Directory Alphabetizer"; CoCo1/CoCo2/CoCo3; January 1991, p.55. Arrange disk filenames in alphabetical order. DIRALPHA.
Delbourgo, Bob. "In the Name of Equality"; CoCo1/CoCo2/CoCo3; January 1991, p.61. A number-scramble game. EQUALITY.
Distefano, Tony. "Turn of the Screw"; August 1990, p.48. "Build Your Own EPROM Programmer".
Distefano, Tony. "Turn of the Screw"; September 1990, p.66. "EPROM Programmer, Part II".
Distefano, Tony. "Turn of the Screw"; CoCo1/CoCo2/CoCo3; October 1990, p.64. "EPROM Programmer, Part III". MAKEPROM.
Distefano, Tony. "Turn of the Screw"; December 1990, p.52. "EPROM Programmer Handbook".
Distefano, Tony. "Turn of the Screw"; January 1991, p.36. "How Cold Is It?".
Distefano, Tony. "Turn of the Screw"; March 1991, p.31. "How Cold Is It?: Part II".
Distefano, Tony. "Turn of the Screw"; May 1991, p.46. "Multiple A-to-D Input".
Distefano, Tony. "Turn of the Screw"; June 1991, p.58. "On CoCo Time".
Dufur, Glen. "Home Budget Analyst 4.0"; CoCo1/CoCo2/CoCo3; February 1991, p.10. Record and maintain your personal budget. BUDGET.
Ebacher, Jerome. "Addition"; CoCo1/CoCo2/CoCo3; September 1990, p.93. Timing drills to improve math skills. ADDITION.
Elliott, Phil. "Coloring"; CoCo3; January 1991, p.44. Use your own colors to fill designs on the graphics screen. ING.
Enger, David C. "Quick Directory Sorter"; CoCo1/CoCo2/CoCo3; February 1991, p.54. A machine-language, directory-sorting utility. DIRSORT.
Estrado, Richard. "Freedom"; CoCo1/CoCo2/CoCo3; April 1991, p.53. A graphics program of randomly-moving snake lines. FREEDOM.
Falk, Lonnie. "Print#-2"; July 1990, p.8. "Happy Anniversary".
Falk, Lonnie. "Print#-2"; August 1990, p.8. "A Bright Horizon".
Falk, Lonnie. "Print#-2"; September 1990, p.8. "It All Started With Education".
Falk, Lonnie. "Print#-2"; October 1990, p.8. "Graphically Speaking".
Falk, Lonnie. "Print#-2"; November 1990, p.8. "World Net".
Falk, Lonnie. "Print#-2"; December 1990, p.8. "Unto What Far Harbor?".
Falk, Lonnie. "Print#-2"; January 1991, p.8. "Keeping the Spirit".
Falk, Lonnie. "Print#-2"; February 1991, p.8. "Documented Evidence".
Falk, Lonnie. "Print#-2"; March 1991, p.8. "Come One, Come All".
Falk, Lonnie. "Print#-2"; April 1991, p.8. "CoCo Hits a High Note".
Falk, Lonnie. "Print#-2"; May 1991, p.8. "My First Printer".
Falk, Lonnie. "Print#-2"; June 1991, p.8. "Binary Blueprints".
Fingliss, Douglas. "Craps"; CoCo1/CoCo2/CoCo3; March 1991, p.57. A game of rolling the dice. CRAPS.
Friesen, Geoff. "Automatic Error Entry"; CoCo3; February 1991, p.92. Enter the EDIT mode automatically on error detection. AUTOERR.

Yes! They're still available

Rainbow Back Issues

BACK ISSUES STILL AVAILABLE
Have you explored the wealth of information in our past issues? From our very first, four-page issue to many with more than 300 pages of material, it's all just for CoCo users — a great way to expand your library!

A WORLD OF INFO AT A BARGAIN PRICE
All back issues sell for the single issue cover price. In addition, there is a $3.50 charge for the first issue, plus 50 cents for each additional issue for postage and handling if sent by United Parcel Service. There is a $5 charge for the first issue, plus a $1 charge for each additional issue on orders sent by U.S.Mail. UPS will not deliver to a post office box or to another country.

MOST ISSUES STILL AVAILABLE
Available issues through June 1982 are provided on white paper in a reprint form. All others are in regular magazine form. VISA, MasterCard and American Express accepted. Kentucky residents please add 6 percent sales tax; Canadian residents, 7 percent GST. In order to hold down costs, we do not bill, and no C.O.D. orders are accepted.

Due to heavy demand, we suggest you order the back issues you want now while supplies last. To order, review and fill out the form below and mail it with your payment.

For greater convenience, order through the Rainbow Magazine Services area of our Delphi CoCo SIG.

RAINBOW INDEX
A complete index for, July 1981 through June 1984, is printed in the July 1984 issue. Separate copies are available for $2.50 plus 50¢ handling. Indexes for subsequent years are published annually in the July issues of THE RAINBOW.

TOTAL _____
KY RESIDENTS ADD 6% _____
CANADIAN RESIDENTS ADD 7% GST _____
U.S. MAIL CHARGE _____
SHIPPING & HANDLING _____
U.P.S. CHARGE _____
TOTAL AMOUNT ENCLOSED _____

Article Reprints
In instances where a given issue is now out of print and not available for purchase, we do provide photocopies of specific articles. The cost for this service is $1.50 plus 50 cents S/H per article. This service is provided *only* in the case of out-of-stock issues.

Name _____
Address _____
City _____ State _____ Zip _____
❑ Payment Enclosed, or
Charge to my: ❑ VISA ❑ MC ❑ AE
CARD # _____
EXPIRATION DATE _____ PHONE ( ) _____
SIGNATURE _____

TO ORDER BY PHONE (credit card orders only) call (800) 847-0309, 9 a.m. to 5 p.m. EST. All other inquiries call (502) 228-4492.
send to: THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059

Please send me the following back issues:

	VOLUME 1				**VOLUME 2**		
JUL 81	Premier Issue	$2.00	❑	JUN 83	Printers	$2.95	❑
AUG 81		$2.00	❑				
NOV 81		$2.00	❑		**VOLUME 3**		
FEB 82		$2.00	❑	AUG 83	Games	$2.95	❑
SEP 83	Education	$2.95	❑	MAR 88	Business	$3.95	❑
OCT 83	Graphics	$3.95	❑	APR 88	Home Help	$3.95	❑
MAR 84	Business	$3.95	❑	MAY 88	Printer	$3.95	❑
APR 84	Gaming	$3.95	❑	JUN 88	Music	$3.95	❑
MAY 84	Printer	$3.95	❑	JUL 88	Anniversary	$3.95	❑
JUN 84	Music	$3.95	❑				
JUL 84	Anniversary	$3.95	❑		**VOLUME 8**		
				AUG 88	Games	$3.95	❑
	VOLUME 4			SEP 88	Education	$3.95	❑
AUG 84	Games	$3.95	❑	OCT 88	Graphics	$3.95	❑
SEP 84	Education	$3.95	❑	NOV 88	Data Comm.	$3.95	❑
OCT 84	Graphics	$3.95	❑	DEC 88	Holiday	$3.95	❑
NOV 84	Data Comm.	$3.95	❑	JAN 89	Beginners	$3.95	❑
DEC 84	Holiday	$3.95	❑	FEB 89	Home Help	$3.95	❑
JAN 85	Beginners	$3.95	❑	MAR 89	Hardware	$3.95	❑
FEB 85	Utilities	$3.95	❑	APR 89	Business	$3.95	❑
MAR 85	Business	$3.95	❑	MAY 89	Printer	$3.95	❑
APR 85	Simulations	$3.95	❑	JUN 89	Summer Fun	$3.95	❑
MAY 85	Printer	$3.95	❑	JUL 89	Anniversary	$3.95	❑
JUN 85	Music	$3.95	❑				
JUL 85	Anniversary	$3.95	❑		**VOLUME 9**		
				AUG 89	Beyond BASIC	$3.95	❑
	VOLUME 5			SEP 89	Education	$3.95	❑
AUG 85	Games	$3.95	❑	OCT 89	Graphics	$3.95	❑
SEP 85	Education	$3.95	❑	NOV 89	Data Comm.	$3.95	❑
OCT 85	Graphics	$3.95	❑	DEC 89	Holiday	$3.95	❑
NOV 85	Data Comm.	$3.95	❑	JAN 90	Beginners	$3.95	❑
DEC 85	Holiday	$3.95	❑	FEB 90	Home Help	$3.95	❑
JAN 86	Beginners	$3.95	❑	MAR 90	Hardware	$3.95	❑
FEB 86	Utilities	$3.95	❑	APR 90	Business	$3.95	❑
MAR 86	Business	$3.95	❑	MAY 90	Printer	$3.95	❑
APR 86	Home Help	$3.95	❑	JUN 90	Summer Fun	$3.95	❑
MAY 86	Printer	$3.95	❑	JUL 90	Anniversary	$3.95	❑
JUN 86	Music	$3.95	❑				
JUL 86	Anniversary	$3.95	❑		**VOLUME 10**		
				AUG 90	0S-9	$3.95	❑
	VOLUME 6			SEP 90	Education	$3.95	❑
AUG 86	Games	$3.95	❑	OCT 90	Graphics	$3.95	❑
SEP 86	Education	$3.95	❑	NOV 90	Data Comm.	$3.95	❑
OCT 86	Graphics	$3.95	❑	DEC 90	Holiday	$3.95	❑
NOV 86	Data Comm.	$3.95	❑	JAN 91	Beginners	$3.95	❑
DEC 86	Holiday	$3.95	❑	FEB 91	Home Help	$3.95	❑
JAN 87	Beginners	$3.95	❑	MAR 91	Hardware	$3.95	❑
FEB 87	Utilities	$3.95	❑	APR 91	Music	$3.95	❑
MAR 87	Business	$3.95	❑	MAY 91	Printer	$3.95	❑
APR 87	Home Help	$3.95	❑	JUN 91	Summer Fun	$3.95	❑
MAY 87	Printer	$3.95	❑	JUL 91	Anniversary	$3.95	❑
JUN 87	Music	$3.95	❑				
JUL 87	Anniversary	$3.95	❑				
	VOLUME 7						
AUG 87	Games	$3.95	❑				
SEP 87	Education	$3.95	❑				
OCT 87	Graphics	$3.95	❑				
NOV 87	Data Comm.	$3.95	❑				
DEC 87	Holiday	$3.95	❑				
JAN 88	Beginners	$3.95	❑				
FEB 88	Utilities	$3.95	❑				

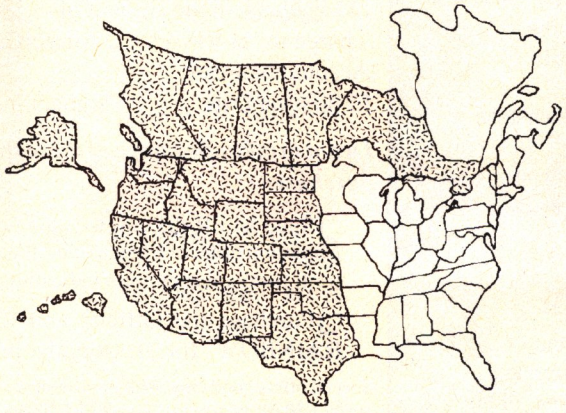
Friesen, Geoff. "BASIC+"; CoCo3; June 1991, p.32. Several new commands for BASIC. MKDAT.
Friesen, Geoff. "Descriptive Error Messages"; CoCo3; October 1990, p.51. User-friendly error messages. ERRMSG.
Friesen, Geoff. "Last Line Recall"; CoCo3; October 1990, p.87. Redisplay the last command line you entered under BASIC. LASTLINE.
Friesen, Geoff. "Line Copy"; CoCo1/CoCo2/CoCo3; August 1990, p.70. Copy single BASIC program lines from place to place. LCOPY.
Friesen, Perry. "Music Test"; CoCo3; April 1991, p.31. Learn the lines and spaces on the bass and treble clefs. MUSICTST.
George, Tom. "Picture This!"; CoCo3; October 1990, p.10. Spectra 3: full-featured graphics editor. MAKESPEC.
Goff, Kelly. "Ninth Year of Rainbow, The"; July 1990, p.64. An index of articles, programs, reviews, and authors.
Goldberg, Stephen B. "Append"; CoCo1/CoCo2/CoCo3; January 1991, p.68. A multi-purpose text-file utility. APPEND.ASM.
Goldberg, Stephen B. "For Your Eyes Only"; CoCo1/CoCo2/CoCo3; July 1990, p.32. Logon protection for the single-user OS-9 system. LOG.ASM.
Goldberg, Stephen B. "Sort"; CoCo1/CoCo2/CoCo3; March 1991, p.28. A utility to sort lines in text files. SORT.ASM.
Goldberg, Stephen B. "Tree Grows in OS-9, A"; CoCo1/CoCo2/CoCo3; February 1991, p.62. Print a directory tree for your disks. TREE.ASM.
Goodman, Marty. "A Monitor for the CoCo 3"; March 1991, p.14. An update on monitors for the CoCo 3.
Goodman, Marty. "CoCo Consultations"; July 1990, p.58. "Bridge the 68000 Gap".
Goodman, Marty. "CoCo Consultations"; August 1990, p.62. "Hard Drives for 68K".
Goodman, Marty. "CoCo Consultations"; September 1990, p.52. "Programming the PIAs".
Goodman, Marty. "CoCo Consultations"; October 1990, p.52. "Disk-Drive Blues".
Goodman, Marty. "CoCo Consultations"; November 1990, p.24. "Shifting Gears".
Goodman, Marty. "CoCo Consultations"; December 1990, p.68. "GIME Ghostbusters".
Goodman, Marty. "CoCo Consultations"; January 1991, p.56. "Best Timing for 512K".
Goodman, Marty. "CoCo Consultations"; February 1991, p.94. "Disk Drive Power".
Goodman, Marty. "CoCo Consultations"; March 1991, p.38. "Sound Advice".
Goodman, Marty. "CoCo Consultations"; April 1991, p.46. "Modem Upgrades".
Goodman, Marty. "CoCo Consultations"; May 1991, p.42. "Memory Upgrades".
Goodman, Marty. "CoCo Consultations"; June 1991, p.63. "Terminal Programs".
Harris, Dale. "Banzai!"; CoCo3; September 1990, p.18. Earn a black belt in joystick karate. KARATE.
Harris, Warren & Harris, Neil. "KnightShift"; CoCo1/CoCo2/CoCo3; May 1991, p.16. A game of medieval conquest. KNIGHT.
Hart, Timothy W. "Handy Labeler"; CoCo3; July 1990, p.10. LABEL.
Haverstock, Mark & Wills, Bill. "CoCo Home Video Companion"; December 1990, p.10. Let the CoCo 3 create titles, credits, graphics for videos.
Hegberg, Joel Mathew. "Better Letters"; CoCo3; December 1990, p.46. Build more interconnected words to win. ADD-ON.
Hennon, Tim. "Music Grid"; CoCo3; April 1991, p.60. Create random musical tones and flashing lights. MUSCGRID.
Hoin, Dennis. "Make or Break"; CoCo1/CoCo2/CoCo3; June 1991, p.65. Get ahead in this real-life game. SCREEN51.
Hooper, Marvin. "Compound Interest"; CoCo1/CoCo2/CoCo3; May 1991, p.55. A simple program to compound interest for specific periods. COMP - INT.
Houk, Cecil C. "MIDI Mods"; April 1991, p.62. Fighting back against barely sufficient synthesizer designs.
Hunt, Matthew. "Plot a Lot"; CoCo3; September 1990, p.10. Make abstract math formulas concrete. GRAPH.
Issel, Jim K. "Terminal Entries"; November 1990, p.62. Get a handle on some current communications programs.
Isted, Bruce. "CoCo 3 GIME CART* IRQs Explained"; CoCo3; August 1990, p.20. A software technique that ends cartridge-interrupt problems. IRQPOLL.ASM.
Jackson, Christopher. "If Wife = Sue, Bring Your Potato Salad"; CoCo1/CoCo2/CoCo3; September 1990, p.83. An interpretive mail-merge utility. TSMAIL.
Johnson, Neil. "Slot Machine"; CoCo1/CoCo2/CoCo3; June 1991, p.20. A CoCo game that brings Las Vegas to you. SLOT.
Jorgenson, Mike. "Disk Master 3"; CoCo3; January 1991, p.10. Seven menu-driven utilities to take control of your system. CONFIG.
Kenny, Keiran. "Angles on the CoCo"; CoCo3; December 1990, p.73. An educational introduction to trigonometry. COCOTRIG.
Kenny, Keiran. "CoCo 3 Joystick"; CoCo3; August 1990, p.59. A simple joystick doodling program. JOYSTK3.
Kenny, Keiran. "Graphics Experiments"; CoCo3; March 1991, p.78. Some hints on graphics programming. HSCR4EXP.
Kenny, Keiran. "Hi-Res Art Pie"; CoCo3; June 1991, p.18. Learn how to determine and set screen coordinates. HIRESPIE.
Kenny, Keiran. "Hot Gold"; CoCo1/CoCo2/CoCo3; December 1990, p.57. Find the hidden treasure. HOTGOLD.
Kenny, Keiran. "Neat Labels"; CoCo1/CoCo2/CoCo3; February 1991, p.24. Print address labels from data statements. LABELS.
Kenny, Keiran. "Peeking at 135"; CoCo1/CoCo2/CoCo3; November 1990, p.75. Use Address 135 for monitoring user input. PEEK135.
Kessler, Gary C. "Brief Introduction to Modems, A"; November 1990, p.12. Introduction to data communications using modems.
Kientzle, Tim. "Displaying Picture Files OS-9, Part III"; CoCo3; December 1990, p.34. Another look at data-compression techniques. SETBUFFER.B0.
Kientzle, Tim. "Displaying Picture Files Using OS-9"; CoCo3; November 1990, p.48. Run-length decoding techniques and displaying images. GETLINE.
Kientzle, Tim. "Getting the Picture With OS-9"; CoCo3; October 1990, p.44. Picture-storage formats and displaying images with OS-9. VEF.
Knapik, Steve. "Loans"; CoCo1/CoCo2/CoCo3; February 1991, p.29. Quickly find monthly payments and interest on loans. LOANS.
Kuns, Eddie. "Database Report"; July 1990, p.62. "Binary Potpourri".
Kuns, Eddie. "Database Report"; August 1990, p.14. "Uploads Galore!".
Kuns, Eddie. "Delphi Bureau"; September 1990, p.70. "Online Interactions".
Kuns, Eddie. "Delphi Bureau"; October 1990, p.68. "New Machines Coming".
Kuns, Eddie. "Delphi Bureau"; November 1990, p.58. "New Delphi Rates".
Kuns, Eddie. "Delphi Bureau"; December 1990, p.58. "The Delphi Mailman".
Kuns, Eddie. "Delphi Bureau"; March 1991, p.61. "The Mad Slasher".
Kuns, Eddie. "Delphi Bureau"; April 1991, p.54. "Conference".
Kuns, Eddie. "Delphi Bureau"; May 1991, p.22. "Conference Control".
Kuns, Eddie. "Delphi Bureau"; June 1991, p.22. "Online Efficiency".
Larson, Richard. "Timer"; CoCo1/CoCo2/CoCo3; February 1991, p.60. CoCo makes a countdown timer. TIMER.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; July 1990, p.72. "The Missing Link".
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; August 1990, p.72. "BASIC09 Interfacing". GETID.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; September 1990, p.28. "Reading and Writing". PRINT_TEST.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; October 1990, p.30. "Easy Access". OPEN_TEST.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; December 1990, p.87. "'tis the C Zen".
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; January 1991, p.52. "The C Zen Continues". TEST_1.C.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; February 1991, p.22. "'tis Still the C Zen". READ_TEST.C.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; March 1991, p.72. "The Auto Formatter". AUTO.B09.
Law, Greg. "BreakPoint"; CoCo1/CoCo2/CoCo3; April 1991, p.28. "Making Directories". MAKEDIR.C.
Law, Greg. "BreakPoint"; CoCo3; May 1991, p.20. "Graphics Functions".
Law, Greg. "BreakPoint"; CoCo3; June 1991, p.28. "Cause for Arguments".
Law, Greg. "Organized Chaos"; June 1991, p.10. Programming techniques.
Liming, Douglas. "Pop-up Menus"; CoCo1/CoCo2/CoCo3; November 1990, p.52. Expedite the menu-creating process. POPUP.
Ling, Sharon. "Huck Bucks"; CoCo1/CoCo2/CoCo3; December 1990, p.50. Make play money with the CoCo and a printer. HUCKBUCK.
Lorbieski, Richard. "Turbo Light"; May 1991, p.53. A bright idea for monitoring clock speed on the CoCo 3.
Ludwig, John. "Doublewide"; CoCo1/CoCo2/CoCo3; August 1990, p.44. Print double graphics screens side-by-side. DBLWIDE.
Macias, David. "Appreciatin' Depreciation"; CoCo1/CoCo2/CoCo3; February 1991, p.46. Learn to get along with depreciation calculations. DEPRECIATE.B.
McCarthy, James. "Credits"; CoCo1/CoCo2/CoCo3; March 1991, p.9. Let CoCo roll the credits for your production. CREDITS.
Meijering, Rudy. "Solid Foundation in Chemistry"; CoCo3; February 1991, p.66. CoCo becomes a chemistry tutor. CHETUTOR.
Merryman, Robert C. "Disk Controller ROM Selector"; March 1991, p.34. Switch between two disk ROMs.
Mikel, Jeff. "OS-9 Assembly Language"; CoCo3; June 1991, p.40. A guide for assembly-language programmer moving to OS-9. FIRST.A.
Milam, Loy. "Ohm's Law"; CoCo1/CoCo2/CoCo3; March 1991, p.42. Ohm's-law calculator. OHMS-LAW.
Moore, Mike. "Directory Lister"; CoCo1/CoCo2/CoCo3; January 1991, p.86. Send the directory listing to the printer. DIRLIST.
Mosley, John. "Spiral"; CoCo3; August 1990, p.42. A look at spiralized triangles. SPIRAL.
Musumeci, John. "Note Writer"; CoCo3; February 1991, p.92. A quick note and memo editor. NOTERITE.
Musumeci, John. "Note Writer 2 x 40"; CoCo3; June 1991, p.16. Print 80-column notes and letters without the hassle. NOTE2X40.
Myers, Nancy. "Stuff"; August 1990, p.92. A computer widow's tale.
Nee, William P. "Assembly Line, The"; CoCo1/CoCo2/CoCo3; September 1990, p.48. Simulating movement and change in the game of life. EATING1.
Nee, William P. "Assembly Line, The"; CoCo1/CoCo2/CoCo3; October 1990, p.54. Teaching your computer to read and modify BASIC. INPUT.
Nee, William P. "Assembly Line, The"; CoCo1/CoCo2/CoCo3; November 1990, p.32. An imaginary machine (Turing) comes to life. TURING1.
Nee, William P. "Assembly Line, The"; CoCo1/CoCo2/CoCo3; February 1991, p.30. Graphing with a permutation of Mandelbrot. MANDEL1.
Nee, William P. "Assembly Line, The"; CoCo1/CoCo2/CoCo3; March 1991, p.51. Moving and twisting pictures on the graphics screens. WARP1.
Nee, William P. "Assembly Line, The"; CoCo1/CoCo2/CoCo3; May 1991, p.56. Food for thought in the game of life. PREDATOR.
Nee, William P. "Assembly Line, The"; CoCo1/CoCo2/CoCo3; June 1991, p.76. Searching word puzzles. WORDPUZL.
Nee, William P. "Assembly Line, The,"; CoCo1/CoCo2/CoCo3; August 1990, p.52. A machine-language, spiral-graph program. SPIRO1.
Olive, Tony. "Going Online: Primed and Ready"; November 1990, p.46. A quick look at a first-timer's online discoveries.
Perlman, Richard. "Do-It-Yourself Database, Part V"; CoCo1/CoCo2/CoCo3; July 1990, p.36. A database to track household financial information. RETRV.
Phillips, Charles F. "Soldering Fundamentals"; March 1991, p.44. Soldering tips for the hardware tinkerer.
Pillot, Giancarlo. "Music Catalog"; CoCo1/CoCo2/CoCo3; November 1990, p.56. An instrumental program for tracking your tunes. MUSIC.
Pittman, Larry. "Weights and Measures"; CoCo3; January 1991, p.28. Quickly convert from one type of measurement to another. MEASURE.B09.
Puckett, Dale. "KISSable OS-9"; CoCo3; July 1990, p.48. "Loan Procedures for MVFinance". UPDATE1.
Puckett, Dale. "KISSable QS-9"; CoCo3; August 1990, p.38. "CoCo 3 Does Windows".
Puckett, Dale. "KISSable OS-9"; CoCo3; September 1990, p.39. "OS-9 Gets the Grades". GRADEBOOK.
Puckett, Dale. "KISSable OS-9"; CoCo3; October 1990, p.58. "OS-9 Graphics Primitives". OBJECTS.SCR.
Puckett, Dale. "KISSable OS-9"; CoCo3; November 1990, p.27. "Automating the Online Experience". MENUSETUP.
Puckett, Dale. "KISSable OS-9"; December 1990, p.21. "Legends of the C".
Puckett, Dale. "KISSable OS-9"; CoCo3; January 1991, p.46. "Basic Instructions".
Quellhorst, George. "Pyramid"; CoCo3; May 1991, p.78. An addictive, easy-to-play solitaire game. PYRAMID.
Quellhorst, George. "Resounding CoCo"; CoCo3; April 1991, p.10. A graphical rewite of Music+. MUSIC3+.
Rainbow Staff. "RAINBOWfest 1990"; March 1991, p.48. Photos from the Chicago 1990 show.
Rainbow Staff, The. "OS-9 Hotline"; May 1991, p.34. "OS-9 Guidance".
Reighard, Kenneth. "Air Raid"; CoCo1/CoCo2/CoCo3; September 1990, p.31. A high-flying action game. RAID.
Ridings, David. "Tic-Tac"; CoCo3; April 1991, p.50. A game classic. TIC-TAC.
Rogers, Robert. "Laser Cycles"; CoCo1/CoCo2/CoCo3; November 1990, p.60. An action-video game with color graphics and sound. LASER.
Ross, James. "OS-9 File Viewer"; CoCo3; May 1991, p.9. Use keys to scroll forward and backward through ASCII files. SCROLF.B09.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; July 1990, p.54. "Old Game, New Twist". EZTHELLO.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; August 1990, p.30. "EZ-Thello Plays Back". EZTHELO2.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; September 1990, p.36. "Money 'n Math". MATHGEN3.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; October 1990, p.34. "Between Numbers". BETWEEN2.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; November 1990, p.66. "CoCo Tours the States". STATES.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; December 1990, p.28. "The Tour Continues". MATCH50.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; January 1991, p.40. "Visualizing Fractions 2". VISFRAC2.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; February 1991, p.40. "Visualizing Fractions 3". VISFRAC3.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; March 1991, p.20. "Visualizing Fractions 4". VISFRAC4.
Scerbo, Fred B. "Wishing Well"; CoCo1/CoCo2/CoCo3; April 1991, p.58. "Lifeskills 7". LIFESKL7.
Smith, Jay. "Cracking the Nautical Code"; CoCo3; August 1990, p.10. A BASIC program that teaches you international code flags. CODEFLAG.
Stakelin, II Carl J. "Knight's Errant"; CoCo3; July 1990, p.90. Doin' the white/black shuffle. KNIGHT.
Steidl, Jeff. "Just Between Terminals"; CoCo1/CoCo2/CoCo3; July 1990, p.28. Play the role of a data communications chip. DATATRAN.
Stroffolino, Phil. "Jumpman"; CoCo1/CoCo2/CoCo3; February 1991, p.28. A quick look at the basics of graphics animation. JUMPMAN.
Tandberg, Dan. "Wormy"; CoCo1/CoCo2/CoCo3; December 1990, p.20. Steer the growing worm without hitting anything. WORMY.
Taulli, T.C. "Space Kamikaze"; CoCo1/CoCo2/CoCo3; May 1991, p.80. A shoot-'em-up arcade game of kamikaze destruction. SPACE.
Teague, Bob. "Body Mass"; CoCo1/CoCo2/CoCo3; February 1991, p.90. Determine your optimum weight. BODYMASS.
Thompson, Ernie. "Adding Machine"; CoCo1/CoCo2/CoCo3; November 1990, p.36. A printing, adding-machine. ADD.
Tinklepaugh, Dale. "Bond Calculator"; CoCo1/CoCo2/CoCo3; February 1991, p.56. Computerized guidance for calculated risks. BONDCALC.
Turowski, Donald. "Car Quest"; CoCo1/CoCo2/CoCo3; June 1991, p.18. The license-plate game for those trips in the car. CARQUEST.
Walters, Francis M. "Spread a Sheet for Heat Loss"; CoCo1/CoCo2/CoCo3; September 1990, p.60. Using spreadsheets for heat-loss calculations.
Webb, Mark. "Darts"; CoCo3; February 1991, p.83. Throw darts on (not at) your CoCo's screen. DARTS.
Wolf, Eric A. "Pie Plotter"; CoCo3; January 1991, p.83. Create your own pie charts. PIECHART.
Wyss-Gallifent, S. "Doc Reader"; CoCo3; May 1991, p.49. View and print text files quickly and easily. READDOC.
Zore, Ernest F. "Programming Quick Tips"; July 1990, p.61.

Advertisers Index

We encourage you to patronize our advertisers — all of whom support the Tandy Color Computer. We will appreciate your mentioning* THE RAINBOW *when you contact these firms.

Ace	35	Delphi	BC	Rainbow Back Issues	63
Burke & Burke	19	Eversoft Games, Ltd	47	Rainbow Binders	66
Burke & Burke	51	Frank Hogg	53	Rainbow Bookshelf	29
CoCoPRO	21	Granite Computer Systems	39	Rainbow on Tape and Disk	24
Colorware	33	JWT Enterprises	49	Sundog Systems	37
Computer Plus	IFC	Microcom	5	Sundog Systems	IBC
Dayton Associates of W.R. Hall, Inc.	54	Millsoft Co.	51	T & D Software	17
Dayton Associates of W.R. Hall, Inc.	55	Musicware	47	T & D Software	57
Delmar Company	23	Mv	49	Trading Post	39
Delphi	9	Owl-Ware	25	Wasatchware	37
		Owl-Ware	26	Zebra Systems	31
		Owl-Ware	27		

Call:
Belinda Kirby
Advertising Representative
(502) 228-4492



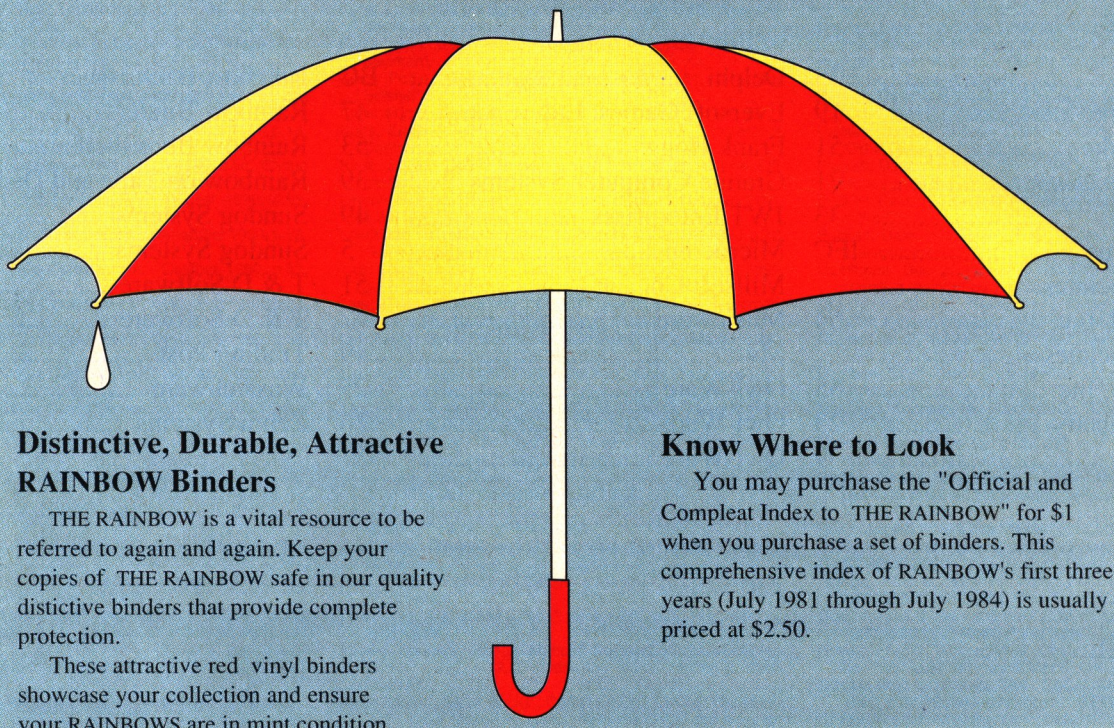
Call:
Kim Lewis
Advertising Representative
(502) 228-4492

The Falsoft Building
9509 U.S. Highway 42, P.O. Box 385, Prospect, KY 40059

FAX (502) 228-5121

Protect

your important magazine collection



Distinctive, Durable, Attractive RAINBOW Binders

THE RAINBOW is a vital resource to be referred to again and again. Keep your copies of THE RAINBOW safe in our quality distictive binders that provide complete protection.

These attractive red vinyl binders showcase your collection and ensure your RAINBOWS are in mint condition for future use. Each binder is richly embossed with the magazine's name in gold on the front and spine. They make a handsome addition to any room.

Put and End to Clutter

Organize your workspace with these tasteful binders. Spend more time with your CoCo and eliminate those frustrating searches for misplaced magazines.

A set of two binders, which holds a full 12 issues of THE RAINBOW, is only $13.50 (plus $2.50 shipping and handling).

Special Discounts on Past Issues

To help you complete your collection of THE RAINBOW, we're offering a special discount on past issues of the magazine.

When you place and order for six or more back issues of THE RAINBOW at the same time you order binders, you are entitled to $1 off the regular back issue price. To order, please see the "Back Issue Information" ad in this issue.

Know Where to Look

You may purchase the "Official and Compleat Index to THE RAINBOW" for $1 when you purchase a set of binders. This comprehensive index of RAINBOW's first three years (July 1981 through July 1984) is usually priced at $2.50.

Yes! Please send me _____ set(s) of Rainbow binders

Name _____

Address _____

City _____

State _____ Zip _____

❑ My check in the amount of _____ is enclosed.

charge to: ❑ VISA ❑ MasterCard ❑American Express

Account Number _____

Expiration Date ____ Signature _____

I want to take advantage of these special offers with my binder purchase:

❑Save $1 off the single issue cover price for back issues. Minimum order of 6 magazines .Please enclose a back issue order form from a recent issue indicating magazines wanted.

❑Purchase the Official and Compleat Index to THE RAINBOW" for $1. (Regular price $2.50.)

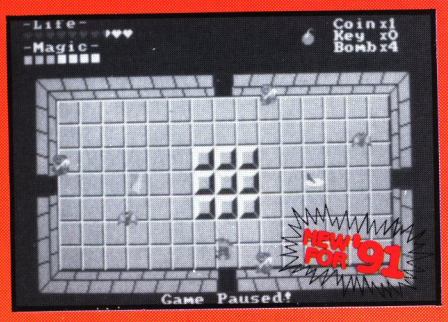
Special offers good only with the purchase of a RAINBOW binder set. Binders are $13.50 per two-binder set plus $2.50 shipping and handling, If your order is to be sent via U.S. mail to a post office box or foreign country, please add $2. Kentucky residents add 6% sales tax; Canadian reidents, 7%GST. U.S. currency only please. In order to hold down non-editorial costs, we do not bill.

Mail to: Rainbow Binders, The Falsoft Building, P.O. Box 385, Prospect KY 40059. For credit card orders call(800) 847-0309, 9a.m. to 5 p.m. EST. All other inquiries call (502) 228-4492

NEW FOR '91

SUNDOG SYSTEMS

The Quest for THELDA

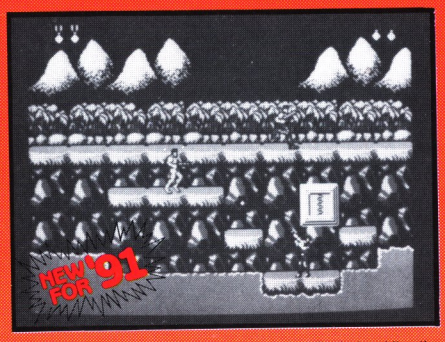


Better men than you have failed the quest, but the hand of the good princess Thelda is too much to resist! Stolen by the evil necromancer Divinax, she has been secreted far from prying eyes and it is now up to you to regain the pieces of the mystical Life Force and save the fair lady. The Quest for Thelda is an outstanding arcade program that combines action and adventure to bring you an incredible video game playing experience. Travel throughout over 500 different screens searching for magical objects and spells, fighting horrible creatures, and gathering the various parts of the Life Force guarded by ever-increasing terrors. You'll enjoy the highest quality 320x200 resolution 16 color graphics and digital sound effects that you've come to expect from Sundog Systems. The game play is fast and furious, and only you can rescue the princess and complete the **LEGEND OF THELDA!** Req. 128K CoCo 3, disk drive, and joystick (2-button joystick supported).

$34.95

Hint book now available for Thelda! Contains clues, maps, and even a BASIC program to modify your own characters! **$4.95**

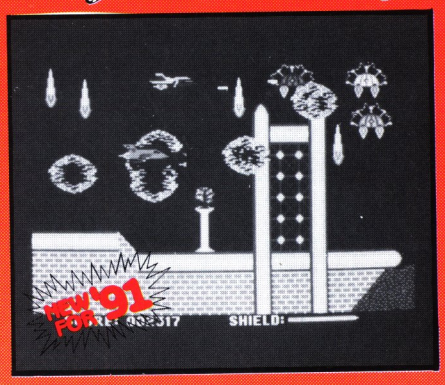
THE CONTRAS



In the year 2671, a mysterious object landed on Earth, heralding the alien invasion of the Red Falcon. Only two courageous soldiers have a hope of stemming this alien infestation. Armed with your military training and the latest weapon technology, you and a friend must fight back the horde. Sundog Systems presents our second 512K game, **The Contras.** You'll see why we decided to use 512K on this project! Amazing graphics with 320x225 resolution, 16 color full screen animation and horizontal smooth scrolling! Background digital sound effects and real-time music! One or two player action AT THE SAME TIME! You'll agree that this is one of the best arcade games yet for your 512K CoCo 3. Needless to say, playing hero won't be easy; playing The Contras will be tougher! Req. 512K CoCo 3, disk drive, and 2-button joystick.

$34.95

Crystal City



The superior technology of the evil Overlords has ensnared yet another innocent planet; however, this one contains the Crystal City, bastion of democracy and independence. Earth has had enough! Break through level upon level of their virtually invulnerable defenses, defeat the end guardians, and make your way ever closer to freeing the slaves of the Crystal City! This amazing arcade game is an achievement in its own right. Full 128K/512K utilization! Super fast horizontal hardware scrolling on the 128K computer! Wild digital sound effects and background music score! 30 minutes, or over 30 megabytes, of non-repeating 320x200 resolution, 16 color graphics! This game has it all; order a demo disk to see it first! Can you save the Crystal City from unbeatable foes? Req. 128K CoCo 3, disk drive, and joystick.

$34.95

zenix

You have been chosen to pilot the spacecraft wielding the plutonium plasma laser against the nefarious insectoids, the Zenians. These bugs have been ripping off the space trade lines for years; now they're about to find a victim who can fight back! Beat back the swarm of pests to their home planet Zenix, and use the laser to end the menace once and for all. Zenix is a lightning fast arcade game for the 128K CoCo 3. The 320x225 16 color graphics are amazing, as are the digital background music score and effects, all on a 128K computer! The fast action and game play will astound you in this GALAGA of extermination. Plug in your joystick and strap in for the ride of your life! Call to order a demo disk to see the action before you buy! Req. 128K CoCo 3, disk drive, and joystick.

$29.95

SinistaaR

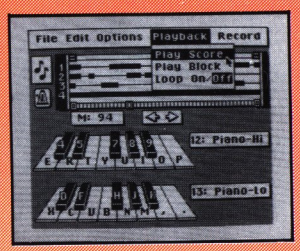
You've raved about this 512K arcade game! The graphics and animation are amazing! You've got to hear the digital sounds! 512K (three disks) packed with excitement. 512K CoCo 3 only. $34.95

KYUM-SAI TO BE NINJA

This martial arts arcade game remains a CoCo 3 phenomenon. One of our best sellers to date! Play the incredible combat experience that you've been missing, and call for the availability of the OS-9 version. 128K CoCo 3 action. $29.95.

OS-9 Version Now Available

SOUNDTRAX



This 128K/512K sound sequencing system has become an immensely popular program. Create musical scores using polyphonic digitized sounds and a user-friendly point and click editor. Call to order the SoundTrax demo program, and get 10% off your purchase with receipt. $34.95

Now Available: SoundTrax instrument sample disks! Guitars, strings, woodwinds, and just plain weird instruments for your composing pleasure. Completely compatible with the SoundTrax system. 3 flippy (2 sides) disks full of sounds. $12.95 each or $29.95 for all three.

ALSO AVAILABLE:

Hall of the King 1, 2, or 3 CoCo 1 - 3	$29.95 ea.
Hall of the King Trilogy	$74.95
White Fire of Eternity CoCo 1 - 3	$19.95
Dragon Blade CoCo 1 - 3	$19.95
Champion CoCo 1 - 3	$19.95
Paladin's Legacy CoCo 1 - 3	$24.95
Warrior King CoCo 3	$29.95
In Quest of the Star Lord CoCo 3	$34.95
Hint Sheet	$ 3.95
Kung-Fu Dude CoCo 1 - 3	$24.95

Visa, Mastercard, Check, Money Order, and COD (USA only, please) accepted. All foreign orders must be sent in US currency Money Orders. Include $2.50 for shipping in USA and Canada. $5.00 Foreign. $3.00 extra for COD orders. PA residents add 6% sales tax. Dealer inquiries welcome. Authors: we're looking for new software!

VISA MasterCard

Sundog systems

We've Moved!

P.O. Box 766
Manassas, VA 22111
703/330-8989

Being online never felt so fine.

Join the online network with personality. The most interesting conferences. 10,000 programs you can download for your own use. All the most popular services.

Two membership plans: $6 an hour or $1 an hour with the 20/20 Advantage.

Join us online, the water's fine.

Free Membership

Dial by modem,

1-800-365-4636

Press return. At password, type RB22

DELPHI

Voice, 1-800-695-4005
617-491-3393